2. It seems that all receivers must support all options. What is the anticipated additional receiver cost to decode all possible encoders?

3. By what test means will we be sure that the option of multiple encoding techniques actually results in better pictures? It is not obvious that inclusion of techniques from all proponents is better than sole use of the best technique.

4. If the intent is to phase out the interlaced format relatively soon, why burden all receivers with extra modes for field/frame motion compensation and field/frame inverse DCTs? The original interlaced AD-HDTV system showed good performance in an interlaced format without field/frame coding and field/frame coding would not be required for a progressive format.

5. How many P-frames are there for each I-frame? Is this relationship fixed or variable? If variable, what are the criteria for choice in any application, and what condition do we use to assess the system's image quality? Likewise, will the slice size be fixed or variable?

6. Is "progressive refresh" exactly the same technique used in the original DigiCipher system, or are there changes? If so, please describe. Does the new proposal likewise have 4 panels with vertical seams? Would horizontal seams be better, especially for VCR trick play?

7. Will I- and P-frames without progressive refresh and P-frames with progressive refresh ever be mixed in the same sequence? (To some extent, they seem mutually exclusive since the refreshed portion of the P-frame would be redundant if I-frames were part of the sequence.)

8. What exactly is meant by "frequency dependent leak?" How is it similar to or different from the "leak" used in DSC-HDTV? How is it similar to or different from the "leak" evaluated by MPEG? What is the benefit derived by including its additional complexity? Would it be mixed somehow with other types of predicted coding (P-frames with or without refresh)? If so, how?

9. Please explain the overhead required for inter/intra coding on an 8x8 block basis. Would each macroblock contain extra bits to

indicate which blocks were inter and which were intra? (If chroma blocks were handled independently, this seems to require about 6 bits per macroblock of extra information, or about 0.972 Mbits/sec. This "worst case" data rate could be reduced with variable length coding, but then another variable length decoder would be required in the receiver.)

10. Are the other "additional syntax elements" and the "encoder prototype implementation features" the same as their embodiments in previous systems, or have they been changed? If changed, please describe.

11. Please explain the "VQ for selection with perceptual coding." Is this is the original DSC-HDTV proposal? How does it relate to MPEG's zig-zag scanning?

12. What motion estimation range is intended, both for the "standard" system and the system with hierarchical motion estimation? Will the decision on whether or not to use B-frames include the effect on motion estimation in the encoder as well as memory in the receiver?

13. Please describe the "non-uniform quantization with new VLCs."

14. No mention is made in this document and inadequate attention was paid in the original systems to other usual consumer products in the family of television, specifically VCRs and camcorders. I believe that, at a minimum, coding techniques that support VCR trick play must be anticipated in the compression. In particular, will the system make easy random access with rapid image acquisition? Will editing of compressed image data streams be possible? Will the system mark data in the bit stream to aid trick play processing? Will data prioritization be used to aid trick play? I attach an appendix with other thoughts and comments.

15. The compression proposals are made in terms of MPEG-2 syntax with extra elements and embellishments. What if MPEG/ISO rejects these extra features? Will U.S. HDTV receivers be burdened with the added complexity anyway, or will we conform to a recognized international standard?

16. How faithfully will the system "use MPEG-2 syntax"? For example, MPEG-2 sequence headers contain such important information as pixel aspect ratio, raster dimensions, frame rate, and buffer size. After random access, such as a channel change, the

presence of this information could not be guaranteed. Will sequence headers be allowed to vary? What about the sequence extensions?

TRANSMISSION

1. From the list of 4 possible modulation schemes, are we to conclude that 16-QAM is no longer being considered? Are 64-QAM or 16-VSB being considered for cable?

2. What is the net data rate for 6-VSB? Please describe the trellis code and compare its gain to that achieved when trellis code is applied to QAM.

3. How will the modulation format selection be made? By what tests, and under whose administration? Will the tests include tuners, or will they compare the inherent performance of the modulation schemes by using a common tuner? Similarly, will the tests include equalizers, and, if so, how will the different equalizer performances be normalized? (Different systems require some inherent differences in equalizers, but simple or elaborate equalizers are possible for all formats.) Will the tests be of bit error rate out of the demodulator (i.e., independently of video)?

4. How will receiver and transmitter tolerance requirements be evaluated?

5. Do SS-QAM and the VSB formats continue to support gradual degradation?

6. How will the modulation support multiple priority data in the "prioritized" data format? Will tests include comparisons of the bit error rates for different priority data?

7. Are any changes contemplated for SS-QAM (e.g., the HP/SP power ratio) or in the distribution of W1/W2 data for the VSB systems? If so, the effects on video quality must also be evaluated in addition to bit error rate.

8. Are the bit synch and equalization training waveforms changed for the VSB proposals from that originally tested? Is the relatively slow repetition rate a limitation for settling time or moving multipath?

AUDIO

No questions at this time. The process indicated for audio system selection contrasts favorably with the apparent all-inclusiveness of the video proposal.

TRANSPORT FORMAT

1. There is much specification needed regarding the "packetized, prioritized data format." Questions are reserved until after the definition on 8/31/93.

2. Please explain the intent and characteristics of the data prioritization. Is this intended to support gradual degradation or is it intended for other functions, such as VCR trick play, scalability, or multi-resolution service? Is it intended that the transmission system handle different priorities differently (e.g., with different power), or will prioritization be a simple data identifier?

3. Will the prioritization scheme be compatible with MPEG-2?

4. Will the packetization be compatible with the MPEG-2 systems layer? If not, will one be a sub-set of the other?

5. What are the goals to be achieved by the transport layer? Is it intended to be used for delivery by several different media (e.g., broadcast, VCR, cable, etc.)? Will the transport layer attempt to supplant some of the video coding syntax layers? The original AD-HDTV removed all video coding layers above the picture header and replaced the slice start code with a slice identification and pointer in the packet header. Such a scheme can save bits in the data, but returning to MPEG-2 compatibility requires a transcoder to generate and insert the skipped headers in order to construct a legal MPEG-2 bit stream.

6. There is an additional issue beyond packet identifiers and progressive scan needed to support computer interactivity. A specification for a "baseband" interface must be created. This is more than just a connector spec. At what place would a digital stream be inserted - after error correction, after decoding, somewhere in between?

7. Is there explicit provision for conditional access on cable?

Appendix: VCR Issues

The Technical Proposal did not address VCR performance, especially for the "trick play" modes that consumers expect. The acceptability and even utility of these modes depends on the compression algorithm and on marking useful subsets of the data. I offer the following thoughts on the attributes desired in an HDTV standard if it is to support all expected VCR operating modes.

A VCR requires rapid acquisition of an essentially perfect image after random access. The VCR must be able to stop and start play of a video program at finely distributed points in the video sequence. Both a GOP structure of I- and P-frames and a progressive refresh scheme offer this capability at the GOP rate or the refresh rate (by accumulating refreshed data for a number of frames). For "leaky" compression, it is more difficult to predict the random access characteristics. Presumably the best situation is to begin the random access at an intra-DC frame, so that an entire frame of DC coefficients is available, and to let the error leak away. Depending on the scene content and the leak factor, this process could require considerably more time than a GOP structure or progressive refresh.

Sequence headers and extensions in the sequence bit stream present an additional problem for random access in VCRs (and for channel change). These headers can contain information which will impact on the video decoding. Examples include downloadable quantization matrices and picture size and frame rate. This information must be available to the VCR at any possible entry point, or else it must be fixed in the standard. In a format with a GOP structure, the I-frame of the GOP is a convenient entry point because it provides a complete image. For progressive refresh or AC leak, without a full I-frame, the information could be inserted with the intra-coded data or with the DC terms, but these points merely serve to start the process of image construction (which would then take several frames to complete). The only alternative to this slowed access is insertion of the headers data into every frame.

The video coding also has a dramatic impact on trick features. Any of the coding schemes seem able to display a still frame at any point and play forward at any speed up to normal. For a system with a GOP, the entire GOP must be buffered then played out forward. Good quality reverse play is more difficult if the VCR does not know the length of the GOP on the particular image sequence being played. For video coding that does not have complete I-frames, it is impossible to decode completely in reverse; because motion compensated prediction is computed only for the forward direction, it is impossible to decode the predicted section in reverse play. (For the progressive refresh, the refresh

areas could be decoded in a reverse mode, and for AC leak the DC intra frames could be decoded, but these approaches would not seem to provide good image quality for "normal speed" reverse.)

Fast trick play requires other features of a bit stream. Since frames are skipped and data is lost in fast play, it is doubtful that any predicted data can be used. That means that fast play decoding is done on the I-frames, the refresh region, or the intra-DC. It is difficult for the VCR to identify intra-coded macroblocks. Methods which mitigate this problem include designating the intra coded data as high priority so that the VCR will only play that data in fast play, or inserting markers at the slice header level to indicate intra coded data. The problem is most acute for the progressive refresh system since there are no intra coded frames (whether full precision or DC) which are marked by the picture header, so without a data partition or slice marker the VCR must variable-length-decode each macroblock to determine if it is intra coded.

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June 18, 1993

Mr. Joseph Flaherty
Co-Chairman, FCC Advisory Committee Technical Sub-Group
CBS
51 West 52nd Street 35th Floor
New York, NY 10019

Dear Joe:

Based on the initial technical description of the "Grand Alliance" ATV system, attached is a list of questions that could be addressed at the upcoming meeting of the FCC Advisory Committee Technical Subgroup.

I look forward to participating at this first meeting with the "Grand Alliance" representatives.

Sincerely,

Lynn D. Claudy
Vice President, Science and Technology

cc: Irwin Dorros

Questions on "Grand Alliance" Technical Description of June 4, 1993

For Consideration by FCC Advisory Committee Technical Sub-Group

June 30-July 1, 1993

Submitted by:

Lynn Claudy
National Association of Broadcasters

==========

1. Scanning Format

a. What are the number of pixels horizontally and vertically used in the various 1050 and 787.5 line modes? What are the "lower horizontal resolutions" referred to in the technical description document? Since these lower horizontal resolution formats would necessarily result in non-square pixels, what is the effect on system interoperability with computers?

b. By agreeing on a progressive display mode for large screen sets, is the Grand Alliance proposing that receiver standards should be incorporated in the FCC transmission standard?

c. To accommodate the various transmission formats, what is the most likely design approach for receiver manufacturers: changing the display scanning rate at the receiver or transcoding the transmitted data stream in the receiver to a single display scanning format? What single display scanning format is most likely to be implemented? What are the costs/benefits of either approach?

d. Explain the benefits of the proposed film rate progressive scan transmission modes:

1. For 1050 line formats, either interlaced or progressive scan could capture the same amount of information from the film frame for transmission. What is the advantage of progressive scan transmission?

2. As a source medium offering high spatial resolution, why would film rendition with 787.5 line resolution be considered acceptable when 1050 line resolution is available?

e. Scanning formats are listed at temporal rates of 24, 30 and 60 Hz. What accommodation is made for 59.94 Hz and 29.97 Hz field and frame rates?

f. Estimate the increased complexity and manufacturing cost for encoders and receivers to support the six scanning formats.

g. What are the technical impediments to implementing a 1050 line progressive scan transmission mode? What migration path is envisioned and how will compatibility with older receivers be handled?

2. Video Compression

a. When will the "Grand Alliance" present their compression scheme to the MPEG-2 Committee? Will submissions be made at the July 12-16 meeting in New York? Describe specific commonalities and differences with the current MPEG-2 proposed algorithm. What are the specific benefits of MPEG-2 compatibility?

b. By accommodating square pixels for the 1050 line modes, the total number of pixels per picture is increased on the order of 20% compared to the previous ATVA and ATRC 1050-line systems. Will this result in increased static (or dynamic) horizontal resolution system performance or is the pixel map internal to the coder adjusted to fewer horizontal samples and interpolated back to square pixels at the output?

3. Transmission

a. Provide technical details of the 6VSB modulation scheme.

b. Provide specifics on how the computer programs used by PS/WP3 would be employed to select the optimum modulation method. What target criteria will be used for assessment?

c. What hardware-based laboratory tests will be used to select the modulation method, if paper analysis fails to reveal an optimum choice?

d. Some European research in terrestrial digital broadcasting favors use of the COFDM system. Are the "Grand Alliance" partners amenable to including COFDM in their comparisons of modulation systems?

4. Audio

a. Will the multi-channel MUSICAM system be sufficiently defined in time to meet the proposed schedule of August 31 for a decision on selected audio system?

b. What organization will perform the simultaneous testing referred to in the system description?

5. Transport format

a. How will data be prioritized?

b. How will the prioritized data be protected against channel errors? Will different priority levels have different amounts of error protective coding?

c. Describe how the transport format will support dynamic allocation of data capacity to services on an as-needed basis.

***

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Dr. Peter Smith
Vice President
Technology

NBC

June 17, 1993

Dr. Joseph Flaherty
CBS
555 W. 57th St., 10th Fl.
New York, NY 10019

Dear Joe:

Thank you for your letter of June 7, 1993 regarding the Grand Alliance proposal. I will be attending the Technical Sub-Group meeting on June 30 and July 1, 1993.

The Grand Alliance technical proposal is rather sparse of detail at this time. I believe it would be helpful to us all to have a document describing the new proposal with as much detail as was provided for the originally tested systems. Such a document would perhaps make some sense of the rationale for the choice of scanning parameters and some of the options for compression.

Specifically, I would ask the Grand Alliance representatives to more clearly describe why they chose the scanning parameters. They should also define terms that are used in their proposal. For example, what is their definition of film material? Is filmed material that is recorded on video tape still film material? Is filmed material recorded and edited with material from other sources still film material?

It would be useful for us to be taken through the various scanning format modes to give us their idea of how each would be used and the benefits that each would provide for particular applications. Again, as an example, how would film material transmitted at 24 or 30 frames per second be displayed?

Why do Grand Alliance members presume that the 1050 line interlace format will be phased out? How has their presumption affected the system specification? In general, what evidence is there to back up the Alliance's preferences, recommendations, and mandates in this proposal?

Similarly, compression, which seems to be the area of most agreement within the Alliance, needs explanation and detail. What are the features of the baseline system which make it better than any of the previous proposals? What techniques have been added to ensure that transmission of 787.5/1:1/60 images is sufficiently improved over what was previously achieved? What new compression techniques are being added that have not previously been a part of a tested system? What is the expected performance improvement from these changes? What features are being removed from the compression used in the two systems that achieved overall best picture quality in ATTC/ATEL testing?

Finally, what is the MIT-AC baseline audio system?

Obviously, as we proceed and get to know more, there will be many more questions. I look forward to working with you on the technical sub-group.

Regards,

Peter Smith

Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

Communications
Research Centre

Centre de recherches
sur les communications

Your file Votre référence

Our file Notre référence

DGBT 4010-8

18 June 1993

(via facsimile)

Messrs. Dr. J.A. Flaherty & Dr. I. Dorros
Co-Chairmen
Technical Sub-Group
Advisory Committee on Advanced Television Service

Gentlemen:

Attached please find a list of questions prepared by the Communications Research Center (CRC) in response to the initial technical description of the proposed "Grand Alliance" advanced television (ATV) system. As you know, the CRC will be represented at the forthcoming Technical Sub-Group deliberations by Dr. Paul Hearty, Director of the CRC's Advanced Television Evaluation Laboratory (ATEL).

The CRC has actively participated in the first phase of the FCC-ACATS process in its role of conducting subjective testing and assessment of the six proponent ATV systems at the ATEL. As well, the CRC's technical experts have participated in the various sub-committees and working parties. Should the need arise to form small specialists groups to expedite the overall process of this second phase, I would be pleased to consider making our experts available to participate in such groups.

I wish you every success in the timely completion of this stage of the work. The establishment of a digital ATV system format is as matter of great interest to all of us in North America.

Sincerely,

William Sawchuk
Director General
Broadcast Technologies Research

cc: Paul Hearty, CRC
Metin Akgun, CRC

Attachment

Canada

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QUESTIONS ON THE GRAND ALLIANCE SYSTEM FROM THE COMMUNICATIONS RESEARCH CENTRE

1. Scan Format

(a) Explain the inter-relationship between the scan formats supported by the Grand Alliance system.

(b) Will consumer products support both 1050 interlaced and 787.5 progressive format? If yes, will it involve some form of format conversion?

(c) What do you expect will be the production format(s)?

2. Video Compression

(a) How do you see your system fitting into the MPEG-2 Profiles?

(b) Will your system be compatible with (i) the MPEG-2 "Main" Profile, (ii) other Profiles?

(c) Will your system support any form of scalability?

(d) Can you quantify or qualify the technical advantages and disadvantages of the additional MPEG-2 syntax elements you propose.

3. Transmission

(a) Are you planning to use spectral shaping (spectrum hole) in the ATV system to reduce interference to and from co-channel NTSC signals?

(b) Will a compatible higher capacity transmission system be available for cable networks?

(c) What kind of synchronization will be used in your system? Will a "pilot" be used?

(d) Could your system support on-frequency repeaters for coverage extension?

(e) What ATV receiver noise figure are you assuming in considering possible transmission schemes?

(f) In terms of coverage area what definitions are you using (instead of the traditional contour A and B definition)?

(g) Would there be value in using a different antenna polarization for ATV transmission than the one used for NTSC as a means for reducing mutual interference?

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June 18, 1993

Dr. Joseph Flaherty
Co-Chairman
ACATS, Technical Sub-Group
c/o CBS Inc.
51 West 52 Street
New York, NY 10019

Dear Dr. Flaherty:

Enclosed please find my questions to the Grand Alliance's technical proposal. My questions are mainly related scanning format and its effects on the receiver cost. Since there are many issues yet to be resolved in the areas other than scanning format, it is difficult to raise specific technical questions. I believe that the member of the Technical Sub-Group will have more questions once more information is disclosed in the coming meeting.

If you have any questions, please call me at (212) 704-9898.

Sincerely,

Keiichi Kubota

Keiichi Kubota
Senior Scientist

June 18, 1993

Questions to the Technical Proposal

Keiichi Kubota (NHK)

GENERAL

What is the schedule to build a prototype hardware, and what part of the attribute described in the technical proposal will be included in the prototype hardware?

SCANNING FORMAT

1. What is the number of active lines and the number of active samples per line for each scanning format?

2. Do you have any recommendation for a production format? There is a consensus in ATSC T4 Task Force on North American HDTV Production Standard that 1080x1920/60/1:1 is the future production standard and either 1080x1920/60/2:1 or 720x1280/59.94/1:1 is an interim standard. How do you handle the 1080x1920/60/1:1 format when the 1050 line progressive format becomes your major input signal?

3. What is the impact on the receiver cost if your system supports various kind of scanning format?

4. What conversion algorithm do you plan to use in a receiver to convert 24/30 Hz of the film mode to 60 Hz? Do you think 2-3 pull-down can provide sufficient motion rendition for HDTV? If no, what is the conversion algorithm, and what will be the impact on the receiver cost?

5. Will your prototype hardware support all of the six scanning format?

VIDEO COMPRESSION

1. What is the latency of your system?

2. How do you maintain the compatibility with the main profile and main level of MPEG-2? Which profile in MPEG-2 does the compression algorithm specified in the proposal correspond to? In MPEG-2 "no B frames" corresponds to the simple profile and "frequency dependent leak" corresponds to the next profile.

3. Do you plan to build a receiver with B frame capability from the beginning of the service in order to accommodate B frame feature when it is introduced in an encoder in the future?

ABSOC
Advanced Broadcasting Systems of Canada Inc.

SYRPOC
Systèmes de radiodiffusion de pointe du Canada Inc.

June 18, 1993

Dr. Joseph A. Flaherty,
Co-Chairman ACATS Technical Subgroup /
Senior Vice President Technology,
CBS Inc.
51 West 52 Street
New York, New York 10019
U.S.A.

Dear Dr. Flaherty:

RE: The "Grand Alliance" Technical proposal: Canadian industry questions and comments.

Please find attached questions and comments on the Grand Alliance Technical proposal provided by Canadian industry through consultation with Advanced Broadcasting Systems of Canada (ABSOC) appointed member group representatives.

We hope that this input provides a useful contribution to the launching of the Technical Subgroup Grand Alliance system review. Please call me if you would like to discuss.

I am very much looking forward to participating in the Technical Subgroup as the appointed observer on behalf of Canadian industry, and I am especially looking forward to the dinner meeting on June 29, 1993.

Yours sincerely,

Carol Darling

Carol Darling, P. Eng.,
Program Director, ABSOC

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Advanced Broadcasting Systems of Canada Inc.

SYRPOC
Systèmes de radiodiffusion de pointe du Canada Inc.

CANADIAN INDUSTRY QUESTIONS AND COMMENTS ON THE GRAND ALLIANCE TECHNICAL PROPOSAL

Introduction

The following questions and comments on the Grand Alliance ATV proposal are provided by Canadian industry in the capacity of "Official Observer" on the Advisory Committee Technical Subgroup. This Canadian Industry submission is based upon input provided by Advanced Broadcasting Systems of Canada Inc. (ABSOC) member group representatives and ABSOC positions submitted to the Canadian Minister of Communications as part of "Principles for Guiding Advanced Television Implementation in Canada", April 30, 1993.

'Canadian industry' is represented through ABSOC, an organization which was established by industry in early 1990, to assist in preparing for the introduction of new broadcasting technologies in Canada. Its Board of Directors represents all facets of the Canadian broadcasting industry including: the Canadian Cable Television Association (CCTA), Canadian Association of Broadcasters (CAB), Telesat Canada, Canadian Broadcasting Corporation (CBC), Canadian Satellite Communications (Cancom), pay/specialty television services, educational broadcasters, and in an ex-officio capacity, the Canadian Department of Communications. A list of ABSOC Board members and information on the overall industry represented, are provided for your reference. (Attachments 1 and 2).

We look forward to contributing in the months ahead to the review of the Grand Alliance ATV proposal and development of a detailed technical plan through our appointed observer on the Technical Subgroup, Ms. Carol Darling.

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1. SCANNING FORMAT

Question #1 What are the cost implications of conversion from various anticipated source formats to each of the multiple formats proposed?

Question #2 Are VTR's operating at 24 frame/sec envisaged for direct input into the encoder?

Question #3 Have the cost implications of including "multiple format" capabilities in the consumer television receiver been considered?

Question #4 Will the ATV receiver include the capability to decode and display NTSC?

2. VIDEO COMPRESSION

Question #5 From Canadian industry's perspective, a key consideration is the degree of compatibility which the ATV system will have throughout the television distribution infrastructure. (i.e. over-the-air, coaxial cable, fibre cable, DTH/DBS satellite, network satellite, video tape and video disc media.)[1] We anticipate some delivery of digitally based signals to the home consumer (via DTH or satellite to cable) to be based upon the International Organization for Standards Development (ISO) MPEG 2 format (with "B-frame" capability). Canadian industry expresses support for achieving as much commonality as is practical, with this international standard.

How would the proposal as stated inter-relate with the emerging profiles being defined within the ISO MPEG 2 process?

Question #6 To the extent that the Grand Alliance proposed approach differs from that for MPEG 2, how would any advantages of this approach be demonstrated?

Question #7 How will existing and emerging production formats "dove-tail" with the proposed transmission system? For example, what video/audio formats are being considered as appropriate for interface at the input to the transmission system?

3. TRANSMISSION

Question #8 Canadian industry believes that within the service area a high availability of ATV service is essential. A strong desire is expressed for selection of a transmission scheme which meets the following objectives:

- coverage as closely as possible approximates the service area currently associated with that of NTSC "Grade B";
- a high level of service availability and reliability is provided (particularly in areas of heavy "shadowing");

---

[1] The Canadian Broadcast Act takes a "technology neutral" approach to the provisioning of broadcast services throughout the broadcasting system.

- interference is minimized to acceptable levels (ATV to ATV and ATV to NTSC);
- simple set-top antennae are required (to whatever extent is possible throughout the service area).

The current Grand Alliance proposal constrains the consideration of transmission schemes to QAM and VSB techniques. Would consideration be given to other approaches which might offer advantages, and perhaps better achieve the desired objectives?

Question #9 Do the proposed transmission techniques differ in suitability (compatibility etc.) for carriage on cable?

Question #10 What provision could be made for higher capacity throughput on cable?

4. AUDIO

Question #11 What consideration should be given to maintain compatibility with the emerging MPEG 2 audio standard?

5. TRANSPORT FORMAT

Question #12 Canadian industry expresses strong support for an ATV standard which is supported throughout the delivery infrastructure to the home consumer. It is hoped that the Grand Alliance ATV system will achieve maximum compatibility with the transport approach to be adopted through the ISO MPEG 2 process. A layered approach, employing a flexible packet multiplex, and the consequent use of standardized headers / descriptors is strongly supported by Canadian industry.

To what extent will the Grand Alliance system support dynamic allocation of channel capacity among services?

Question #13 What capability will be provided for encrypted elective services?

RECEIVER CONSIDERATIONS

Question # 14 It is Canadian industry's desire that the future ATV receiver interface in a reliable and consumer friendly way to all delivery media, and to multimedia services, computers, and consumer devices such as recorders, discs, cameras etc.

What consideration is being given to ensure inter-operability with all delivery media, multimedia services, computers, and other complimentary consumer products?

Question #15 From the perspective of inter-operability and compatibility with all program delivery mechanisms, will the ATV receiver be capable of decoding and displaying other formats such as NTSC and 525-line component wide screen formats?

ATTACHMENT 1

ADVANCED BROADCASTING SYSTEMS OF CANADA (ABSOC) BOARD OF DIRECTORS

MEMBER	***REPRESENTATION***
Linda Rankin, (Chair)	
Ken Stein, President, Canadian Cable Television Assoc. Scott Colbran, Sr. V.P. Cdn & U.K. Systems, Maclean Hunter Cable Mark Pezarro, V.P. Research, Cogeco	Canadian Cable Television Assoc.
David Garforth, Director, Transmission & Distr. Dept. CBC/Radio Canada John Shewbridge, V.P. Planning & Corp. Affairs, CBC/Radio Canada	Canadian Broadcasting Corporation
Michael McCabe, President & CEO, Canadian Assoc. of Broadcasters Gary Maavara, V.P. Operations & Corp. Planning, CTV William McGregor, President, Electrohome Communications	Canadian Assoc. of Broadcasters
Sheelagh Whittaker, President & CEO, CANCOM Ltd.	CANCOM
Larry Boisvert, President, Telesat Canada	Telesat Canada
Peter Bowers, COO, TVOntario	Assoc. of Tele-Education in Canada
André Bureau, President & CEO, Astral Communications Inc. Luther Haave, V.P. & G.M., Superchannel Gerry Janneteau, President, RDS	Pay/Specialty Services

Ex-officio

David Mulcaster, Acting ADM, Res. & Spectrum, Communications Canada Paul Racine, ADM, Communications Policy, Communications Canada	Federal Dept. of Communications

ATTACHMENT 2

ADVANCED BROADCASTING SYSTEMS OF CANADA (ABSOC) INFORMATION ON THE OVERALL CANADIAN INDUSTRY REPRESENTED

Collectively ABSOC member organizations distribute television programming to over 9.7 million households in Canada.

These member organizations represent:

- The Canadian cable industry with over 606 business organizations operating 1,100 cable systems providing cable service to over 7.3 million subscribers;
- The Canadian Broadcasting Corporation (CBC), Canada's public broadcaster, which operates 31 owned and operated TV stations, 28 affiliate stations, an all-news specialty-TV service and an national satellite channel;
- The Private Television industry with 94 stations and 3 networks;
- Educational TV which includes 5 provincially based networks;
- Nineteen pay and specialty television services distributed directly to cable head-ends;
- Telesat Canada, Canada's satellite operator;
- Cancom, which provides programming services to over 2300 Canadian communities and over 20,000 direct-to-home subscribers, and;
- Canadian direct-to-home service distributors.

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Laurence J. Thorpe
Vice President, Production Technology
Sony Advanced Systems Company
Business and Professional Group

June 22, 1993

Mr. Joseph Flaherty
Co-Chairman, FCC Advisory Committee
Technical Subgroup
CBS
51 West 52nd Street 35th Floor
New York, New York 10019

Dear Joe,

Thank you (and Chairman R. Wiley) for inviting me to participate on the Technical Subgroup which will work with the Grand Alliance partners to examine their technical proposal of June 4, 1993. Enclosed are questions (and some comments) which I would recommend be addressed at the June 30-July 1st meeting of your Technical Subgroup.

If any prior clarification is required please do not hesitate to call me (I would be happy also to discuss with any Grand Alliance member). I look forward to an active participation in your first Subgroup meeting.

Sincerely,

Larry Thorpe

Laurence J. Thorpe
Vice President, Production Technology
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cc: Irwin Dorros

LT/atb
LT-305

COMMENTS & QUESTIONS - on the June 4th Technical Proposal for the "Grand Alliance" ATV System - for consideration by the Alliance members and the FCC Advisory Committee Technical Subgroup on June 30 - July 1, 1993

Submitted by:

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1.0 SCANNING FORMAT:

1.1 Multiple Format System:

1.1.1 Six separate scanning formats are listed. Is it planned that the very first system that is implemented will incorporate as many of these as possible - or is it intended to choose one only for the initial deployment of a U.S. ATV service?

1.1.2 If the intention is to evolve the system over time (from one initial unique scanning standard), has a specific migration plan yet been considered?

1.1.3 If it is intended to incorporate most (or all) of the scanning formats from the outset - have the technical and economic implications for the broadcast origination plant been yet considered? Are broadcasters expected, for example, to make individual choices as to implementing their plant entirely in a 787.5 progressive format or alternatively in a 1050/2:1 interlace format?

1.1.4 Are professional broadcast origination equipment manufacturers expected to offer HDTV studio equipment's that are switchable between 1050/2:1 and 787.5/1:1 scanning formats? Have the technical and cost implications of this been considered?

1.2 SQUARE PIXELS:

1.2.1 Assuming 960 active lines are maintained in the 1050 system - somewhere in the neighborhood of 1706 horizontal samples are required to implement a square pixel sampling lattice. Even in 2:1 interlace mode, this implies a data rate considerably higher than that implemented to date either by the former GI or ATRC systems. Is there a technical foundation to suggest that 1706 x 960 could be implemented (in a more efficient bit rate reduction system) at the launch of a U.S. ATV SERVICE?

1.2.2 If 1706 x 960 cannot be implemented in the early days of ATV - what "lower horizontal resolution" sampling structures are planned? Will this be a single number - or a possible hierarchy to allow step-by-step evolution over time (as technology steadily improves)?

1.2.3 If lower horizontal resolutions (and consequently a non-square pixel operation) ARE allowed - has the Alliance given serious consideration to a 1080 line-based ATV transmission scanning structure at the outset? Have the merits of such an approach (from a total broadcast system viewpoint) been considered?

1.2.4 In the event that a lower horizontal sampling is necessary (in the early days) for the 1050 system (thus precluding a square pixel) - has the degree of non-interoperability with computers been given serious study?

1.3 HDTV RECEIVERS:

1.3.1 The "agreement" by the Grand Alliance members that large-screen HDTV receivers (34 inches and above) will incorporate a progressive capability implies an implicit mandate within the eventual FCC ATV transmission standard. This would appear to fly in the faces of historical precedent - which generally leaves receiver performance, features, and facilities to the dynamics of a competitive marketplace. Have the technical and cost implications of such a mandate been studied?

1.3.2 To date, progressive scanning has only been incorporated in modest sized computer displays. It has not been widely implemented in large screen television sets (in the 525/625 world) other than some very high end (and very expensive systems). Thus, insisting that only the larger screens must incorporate progressive scan appears to mandate that consumer choice (in terms of ATV receiver pricing) is imperiled. Have the implications of this been considered? Doesn't this impede the successful launch of an ATV service by precluding a vital marketplace pricing flexibility that has historically been so critical?

1.3.3 CRT's are likely to play a major role in the early days of an ATV service. Progressive scanning at high line rates (higher than our traditional 525) implies new scanning coil designs and higher scanning power. Both will add cost to the ATV receiver. Has this been considered?

1.3.4 In handling multiple scanning formats in an ATV receiver - has the Grand Alliance come to a conclusion as to the relative merits (technical and economic) of a multi-scan receiver system or a single-scan system with appropriate prior image scanning format conversion? If so. what are the specific criteria that led to such a recommendation?

1.4 TRANSMISSION OF FILM ORIGINATED MATERIAL:

1.4.1 Are HDTV telecines expected - from the outset - to incorporate 1050/1:1/24/30 and 787.5/1:1/24/30 switchable capability? Have the technical and cost implications been considered?

1.4.2 There will be considerable cross-conversion of 16:9 and 4:3 program material during the simulcast years. Have the implications of down converting 24fps progressive to 525/59.94 interlaced been examined? Have the implications of up converting 525/59.94 movie originated material to ATV at 24fps progressive been examined?

1.4.3 Telecines today capture the video image in a progressive manner but later transform this to a 59.94Hz