CCITT SGXV
Working Party XV/1
Experts Group for ATM Video Coding

Document AVC-111
Sep. 25, 1991

TOK-17

Coordination meeting
for IVS in B-ISDN

Sep.26, 1991
T. Nishizawa
Chairman WP-11B

Activities of CCIR SG11 for Digital Television

1. Rapid changes from analog broadcasting to digital broadcasting

   - Satellite broadcasting:

     Wide RF-band HDTV satellite broadcasting (13-25GHz band)

     Digital audio broadcasting (DAB) (1-3GHz band)

     ISDB (Integrated Service Digital Broadcasting)

   - Terrestrial broadcasting:

     VHF and UHF band digital television broadcasting (6, 7, 8 MHz RF-bandwidth)

     Digital audio broadcasting (DAB)

   - Data broadcasting

2. Total digitalization from studio production, transmission, emission and reception

   - Studio production :

     See TOK-14 (Question 18/11)

     Digital standard (Rec.601)

     Digital interface standard (Rec.656)

     HDTV studio standard (Rec.709)

     HDTV digital standard (under consideration)

     HDTV digital interface standard (under consideration)

     Bit-rate reduction for studio uses (VTR)

   - Transmission (CMTT):

     User requirements for primary and secondary distribution

- Emission:

  Source coding for terrestrial HDTV broadcasting

  Source coding for satellite HDTV broadcasting

  Generic bit-rate reduction for broadcasting and distribution

  Modulation scheme for satellite and terrestrial broadcasting

- Reception:

  Application of video displays in a varying aspect ratio environment

- Quality objectives

  Quality parameters for bit rate reduction

  Subjective and objective measurements

3. New Questions for digital broadcasting and digital HDTV (Doc. Tok.15)

QUESTION 118/11

THE HARMONIZATION OF STANDARDS FOR HDTV BETWEEN BROADCAST AND NON-BROADCAST APPLICATIONS

(1991)

The CCIR,

CONSIDERING

(a) that HDTV technology, being developed initially for broadcast usage and under study by the CCIR (Recommendation 709, Reports 1217, 801)*, may find applications to non-broadcast uses;

(b) that High Resolution Imaging systems (HRI) have been in use for some time in specialized applications, including medical diagnosis and training, graphics for printing and publications, film production, museums and other non- broadcast uses. These applications may be studied by the ISO, and these studies are of interest to the CCIR;

(c) that a range of equipment for HDTV/HRI, including both professional and consumer uses, may make use of the relevant CCIR and CCITT standards. The standardization of such equipment may be studied by the IEC. These studies are of interest to the CCIR;

(d) that the evolving digital transmission network will be required to transport HDTV/HRI signals for a number of purposes including, for example, transmission and distribution for broadcasting, and is under study by the CCITT and the CMTT;

(e) that mechanisms have been established in Decision 91 for harmonization studies in the field of HDTV/HRI between the CCIR, the IEC, the ISO and the CCITT;

(f) that it may be advantageous to users and manufacturers, if the standards developed by these international bodies were to be based on common principles and to contain a maximum of common elements;

(g) that digital technology offers new opportunities for the harmonization of standards for HDTV/HRI in broadcast and non-broadcast users,

DECIDES that the following question should be studied:

1. what studies concerning HDTV/HRI and relevant to the work of the CCIR are being conducted by the IEC, the ISO and the CCITT; how do these studies relate to those of the CCIR;

2. which principles and elements of the standards for broadcast and non- broadcast uses should be common;

3. for those elements of the HDTV/HRI standards for broadcast and non- broadcast uses which differ, what are the appropriate relationships;

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* See also Recommendations 710, 713, 714 and 716, and Reports 1075 and 1239.

4. how may further commonality of the standards for broadcast and non- broadcast uses be achieved in the future;

5. what recommendations are required for a harmonized set of standards for HDTV/HRI, and which organizations should prepare them;

6. what means can be proposed to enhance harmonization of HDTV/HRI studies in the CCIR with those of the ISO, the IEC and the CCITT?

FURTHER DECIDES that:

1. the response to the above questions should be given in the form of a report to Study Group 11, which should include proposals for future studies and work programmes within Study Group 11;

2. this report should be submitted to Study Group 11 for approval and consequent action;

3. in view of the increasing application of HDTV production in many countries for both broadcasting and non-broadcasting uses, the above studies should be concluded in the study period 1990-1994.

TOK-15

COMITÉ CONSULTATIF INTERNATIONAL
DES RADIOCOMMUNICATIONS
(C. C. I. R.)

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Administrative Circular
AC/325

15 July 1991

TO THE ADMINISTRATIONS, MEMBERS OF THE CCIR

The Nairobi Convention (No. 326) provides that, in the interval between Plenary Assemblies, a Question may be studied when requested or approved by correspondence by at least twenty Members of the Union.

The Administration of Canada has requested that the draft new and revised Questions listed in Annex I be circulated for such approval.

These Questions whose text is to be found in Annex II were prepared at the February meeting of Task Groups 11/1 and 11/2, to clarify and structure the work of Study Group 11 regarding HDTV production and terrestrial emission. The Questions were agreed unanimously in the relevant Task Groups.

In view of the obvious need to render the work of CCIR more effective and the urgency of achieving Recommendations in these areas, Canada proposes that the necessary poll be undertaken as soon as possible, to ensure that those Questions thus adopted, may become the basis for the relevant considerations at the November 1991 meetings of Study Group 11's Working Parties and Task Groups.

It would be appreciated, therefore, if you could advise the Director, CCIR, within two months from the date of this Circular, if you approve the adoption of the annexed texts for study by the CCIR.

If the texts are so approved, the Questions will become official texts of the CCIR attributed to Study Group 11, and will be issued as an addendum to the Questions adopted by the XVIIth Plenary Assembly.

Richard C. Kirby
Director

Annexes 2

ANNEX I

The Questions proposed for adoption are:

Rev. Q.27-2/11 Standards for High-Definition Television Production and International Programme Exchange

The proposal is to review the current Question, concentrating the work and on the development of Recommendations for the HDTV studio and for the international exchange of HDTV programmes. This revision includes the contents of Questions 69/11 and 70/11, that would thus become redundant and could be considered for deletion at an appropriate time.

Rev. Q.47/11 Standards for Digital High Definition Television

The proposal is to review the current Question to set out clearly the needs for Recommendations for the HDTV studio and for international exchange of HDTV programmes in digital form. Emission and distribution matters are dealt with in other parts of this proposal and in certain Questions of the CMTT.

Rev. Q.52/11 Subjective Assessment Procedures for Pictures Originating in a High Definition Television Studio

The proposal is to review the current Question to include a specific reference to the new Recommendation 709 concerning HDTV studio standards, in the work of developing Recommendations for subjective assessments for HDTV images.

Rev. Q.65/11 Interfaces for Digital Video Signals

The proposal is to review the current Question to clearly address the conventional TV systems, while a new proposed Question (Doc. 11-2/TEMP/3, see below) would address HDTV digital interfaces.

Rev. Q.71/11 Overall Picture Quality Evaluations in an HDTV Environment

The proposal is a draft revision to the current Question that makes clear that the intent of the desired Recommendations concerns the overall picture quality in an HDTV chain.

New Q.[AAA/11] Generic Bit Rate Reduction for Broadcasting and Distribution of Digital HDTV and ETV Signals

The proposed new Question requests urgent development of Recommendations for generic coding methods to form the basis of emission and distribution of HDTV to the public. This work is essential for coordination and harmonization of the CCIR activities and for harmonization of CCIR work with that of the CCITT, the ISO and the IEC.

New Q.[AAB/11] Coding for the Broadcasting of HDTV Source Signals in Terrestrial Narrow Band Channels

The proposed new Question sets out clearly the basis for the development of Recommendations for the specific codings required for HDTV delivery in narrow-band terrestrial channels.

New Q.[AAC/11] Planning Parameters for the Broadcasting of HDTV Source Signals in Narrow Band, Terrestrial Channels

The proposed new Question sets out the basis for the development of Recommendations for the planning, propagation and spectrum compatibility aspects of HDTV emission in narrow-band terrestrial channels.

New Q.[AAD/11] Objective Measurements in the HDTV Studio Environment

The proposed new Question addresses the needs for Recommendations concerning performance measurements for HDTV chains and equipment.

New Q.[AAE/11]* Applications of Video Displays in a Varying Aspect Ratio Environment

The proposed new Question sets out the need for Recommendations defining the uses of displays of differing aspect ratios in television broadcasting.

New Q.[11/2 Temp.3] Digital HDTV Studio Interfaces

The proposal is to have a specific Question dealing with HDTV digital interfaces by suitable revision of existing Q.65/11 (see above).

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* The Administration of the United Kingdom has already requested the approval of this Question according to No. 326 of the Nairobi Convention. This request for approval by correspondence has been announced by Circular Letter AC/322 of 22 May 1991, sent to the administrations, members of the CCIR.

ANNEX II

DRAFT REVISION OF QUESTION 27-2/11

STANDARDS FOR THE HIGH-DEFINITION TELEVISION STUDIO AND FOR INTERNATIONAL PROGRAMME EXCHANGE

(1974-1986-1990)

The CCIR,

CONSIDERING

(a) that conventional systems for television are not ideal in respect to picture quality, for example sharpness and sense of reality;

(b) that transmission of wideband video signals in bands for terrestrial and broadcasting-satellite systems as well as over cable systems may be possible;

(c) that progress in the development of displays will permit the use of large-screen, high-definition television displays for domestic viewing;

(d) the existence of Recommendation 709:

(e) the desirability of the compatibility of the HDTV studio standard with a number of vision standards, likely to include conventional PAL/SECAM/NTSC, digital 4:2:2, enhanced vision system based on components,

DECIDES that the following question should be studied

what common standards should be recommended for HDTV production for international programme exchange?

Note - See Reports 801 and 1075; see also Questions 42/11, 47/11, 109/11, 110/11 and 103/11.

FURTHER DECIDES that

1. the results of the above studies should be addressed to:

   - update existing Recommendation(s);

   - prepare new Recommendation(s);

2. the above studies should be completed within the study period 1990 - 1994.

DRAFT REVISION OF QUESTION 47/11

STANDARDS FOR DIGITAL HIGH-DEFINITION TELEVISION

(1990)

The CCIR,

CONSIDERING

(a) that standards for high-definition television are covered in Question 27/11;

(b) the existence of Recommendation 709;

(c) that the development of digital methods of encoding, processing, recording and transmitting high-definition television would make it possible to benefit from the advantages of digital techniques in the production and processing of high-definition television programmes;

(d) that the standardization of such digital methods would rationalize the design of equipment for, and facilitate the international exchange of, high-definition programmes,

DECIDES that the following question should be studied:

1. what methods can be used for the digital coding of high-definition television picture signals inside the studio complex;

2. how can the digital version of the studio HDTV standard be made compatible with the digital 4:2:2 studio standard (Recommendations 601, 656)?

Note - See Report 801.

FURTHER DECIDES that

1. the results of the above studies should be addressed to:

   - update existing Recommendation(s);

   - prepare new Recommendation(s);

2. the above studies should be completed within the study period 1990-1994.

DRAFT REVISION OF QUESTION 52/11*

SUBJECTIVE ASSESSMENT PROCEDURES FOR PICTURES ORIGINATING IN A HIGH-DEFINITION TELEVISION STUDIO

(1990)

The CCIR,

CONSIDERING

(a) that Report 801 outlines the future environment for the production and delivery of high-definition television;

(b) that Report 801 identifies a number of new interfaces, conversion processes, and delivery options for high-definition television;

(c) that a number of texts describe methods and test conditions for the assessment of conventional television pictures;

(d) that Recommendation 709 and Report 801 set out a range of parameters which define high-definition television systems;

(e) that the new aspects of the high-definition television environment may require different methods and test conditions than those used for conventional television;

(f) that Recommendation 710 and Report 1216 describe the methods and test conditions to be used in assessments of high-definition television,

DECIDES that the following question should be studied:

1. which assessment methods and test conditions for specific attributes of the HDTV system should be used to evaluate subjectively system performance at each of the interfaces, conversion processes, and delivery processes identified in Report 801;

2. how the results of the assessment studies conducted should be interpreted;

3. what is the relation between measures of system performance resulting from subjective assessments and those resulting from objective measurements;

4. how the factors that comprise subjective quality and degradation (e.g. sharpness) and the system attributes that relate to judgements of quality and impairment should be identified;

5. how subjective evaluation standard references for both studio and emission qualities should be generated;

6. what is the relation between subjective methods used to assess HDTV systems and those for other applications (e.g. HDTV videoconferencing)?

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* Previously Study Programme 3E/11.

The Director of the CCIR is requested to bring this Question to the attention of the ISO and the CCITT.

Note - See Report 1216 and Recommendation 710.

FURTHER DECIDES that

1. the results of the above studies should be addressed to prepare (a) Recommendation(s);

2. that the above studies should be completed before the end of study period 1990-1994.

DRAFT REVISION OF QUESTION 65/11*

INTERFACES FOR DIGITAL VIDEO SIGNALS**

The CCIR, (1990)

CONSIDERING

(a) that Recommendation 601 has established the basis for digital coding standards for television studios both in countries using the 525-line system and in those using the 625-line system;

(b) that the practical implementation of Recommendation 601 requires definition of the details of various studio interfaces and the data streams traversing them;

(c) that such interfaces should, as far as possible, have common characteristics between 525-line and 625-line versions;

(d) that in the practical implementation of Recommendation 601 it is desirable that interfaces be defined in both parallel and serial forms, and since transmission by optical fibres has advantages, particularly at higher bit rates and over longer distances, it is desirable for compatible optical interfaces to be defined;

(e) that to supplement the specification of interfaces it is necessary to define standard synchronizing signals for television studios using digital encoding;

(f) that consideration should be given to the associated sound channels and to ancillary signals which may be carried with the video;

(g) that digital television signals produced by these interfaces may be a potential source of interference to other services, and due notice must be taken of No. 964 of the Radio Regulations,

UNANIMOUSLY DECIDES that the following question should be studied:

1. what parameters are necessary to define standard interfaces for each digital encoding standard, using the 525-line and 625-line systems in both parallel and serial forms;

2. what common features should be shared by parallel and serial interfaces and by interfaces for the various encoding levels;

3. what parameters are necessary to define compatible optical fibre interfaces;

4. what are the parameters necessary to specify standard synchronizing signals, taking account of the possible need to provide for analogue as well as digital video signals;

5. what ancillary signals are required to be carried across the interfaces with the video signals, and what are the parameters necessary to define standards for these signals;

6. what provisions should be required for the associated sound channels?

Note – See Reports 629, 1088 and Recommendations 601 and 656.

FURTHER DECIDES that:

1. the results of the above studies should be included in (a) Recommendation(s);

2. the above studies should be completed within the study period 1990-1994.

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* Previously Study Programme 25N/11.

** Contributions in response to this Question . . . are of interest to the CMTT. See also Decision 18.

DRAFT REVISION OF QUESTION 71/11*

OVERALL PICTURE QUALITY EVALUATION IN AN HDTV ENVIRONMENT

(1990)

The CCIR,

CONSIDERING

(a) that considerable progress in HDTV technology has been achieved and reported to the CCIR (see Report 801);

(b) the CCIR is responsible to set the overall quality performance of broadcasting chains;

(c) the overall operation of HDTV chains made up of studio, transmission or emission has to be evaluated for that purpose;

(d) that it would be of advantage if evaluation methods used for such tasks are unified for HDTV chains and conventional television chains,

DECIDES that the following question should be studied:

1. what criteria should be recommended for overall picture quality evaluation in an HDTV chain;

2. what methods should be used for that purpose?

FURTHER DECIDES that

1. the results of the above studies should be included in (a) Recommendation(s);

2. the above studies should be completed within the study period 1990-1994 or 1994-1998 at the latest.

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* Previously Study Programme 27C/11.

DRAFT NEW QUESTIONS [AAA/11]*

GENERIC BIT RATE REDUCTION CODING FOR BROADCASTING (TERRESTRIAL, SATELLITE) AND PRIMARY AND SECONDARY DISTRIBUTION OF DIGITAL HDTV AND ETV SIGNALS AND RELATED APPLICATIONS

The CCIR,

CONSIDERING

(a) that rapid progress is being made in bit rate reduction coding techniques;

(b) that bit rate reduction coding of digital HDTV and ETV signals will find wide application for emission by terrestrial and satellite means, for both primary (contribution and distribution) and secondary distribution by cable and optical fibre (see Annex);

(c) that there are advantages in having a maximum of common elements for the bit rate reduction codings in the various applications;

(d) that a number of CCIR Groups are studying or are considering the use of bit rate reduction techniques, including Study Group 11, JIWP 10-11/S, JWP 10-11R and the CMTT for a variety of related applications;

(e) that commonality with bit rate reduction techniques used in related applications (such as equipment for home use) considered by the ISO and IEC may offer further advantages,

DECIDES that the following question should be studied:

1. what are the elements of the generic bit rate reduction coding which can form a single, flexible algorithm or small group of related algorithms, for use in emission, both terrestrial and satellite, for distribution, both primary and secondary, and for related applications;

2. what rationalization can be made of any algorithms under consideration within the CCIR or elsewhere for the noted applications or further similar uses;

3. what methods should be employed to characterize and evaluate such rationalization, noting the interests of the public and manufacturing industries for common equipment and receivers?

Note - See also Question AAB/11.

FURTHER DECIDES that

1. the results of such studies should be presented as (a) new Recommendation(s);

2. the initial studies should be completed within the study period 1990-1994.

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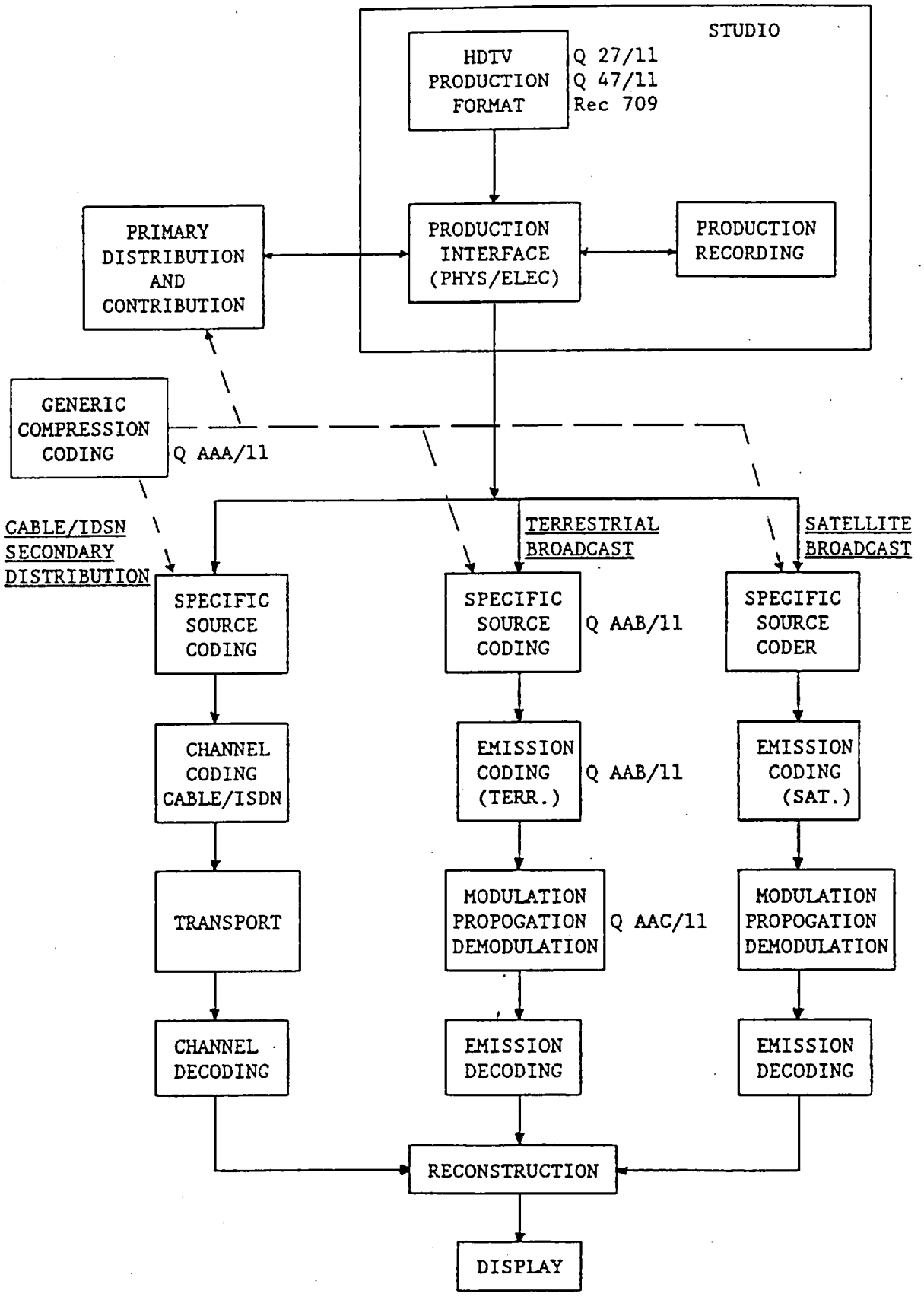
* The Director of the CCIR is requested to bring this Question to the attention of the ISO, the IEC and the CCITT.

ANNEX

HDTV BROADCAST CHAIN
FUNCTIONAL DIAGRAM (REV. 4)



Note - Equipment for home recording is important related matter and is a subject for liaison and harmonization with the IEC.

Definitions

Studio interface

The arrangement for the physical transport, in a transparent fashion, of the generic HDTV production format.

Generic compression coding

Definition of a flexible and coordinated set of compression algorithms and the related signalling protocol.

Specific source coding

Compression of the studio signal to a data rate appropriate for the service quality desired and the channel capacity.

Emission coding

The multiplexing of other data (e.g., audio, text, channel synchronization) addition of error protection and interleaving and spectrum shaping appropriate for the transport channel.

Emission decoding

Recovery of the data-stream including removal of spectrum shaping, error management, demultiplexing.

Reconstruction

Conversion of input data-stream into picture information. This process may be flexible, to accommodate any differences in coding imposed by the various delivery channels.

Display

Conversion of picture information into optical form.

DRAFT NEW QUESTION [AAB/11]

CODING FOR THE BROADCASTING OF HDTV SOURCE SIGNALS IN TERRESTRIAL NARROW-BAND CHANNELS

The CCIR,

CONSIDERING

(a) the rapid progress being made in bit rate reduction techniques and in digital modulation suitable for vision signals;

(b) the digital emission systems may offer advantages in terms of quality and of spectrum efficiency,

DECIDES that the following question should be studied:

1. what are the appropriate bit rate reduction methods to reduce the data rate of the HDTV source signal to a value suitable for terrestrial broadcasting;

2. what are the appropriate methods to multiplex the required signals into the channel (including vision, sound data etc.);

3. what are the appropriate methods for error protection;

4. what are the appropriate strategies to introduce and implement such a service taking account of existing terrestrial broadcast services?

Note - See also Questions AAA/11 and AAC/11.

FURTHER DECIDES that

1. the results of such studies should be presented in the form of new Recommendation(s);

2. the initial studies should be completed within the study period 1990-1994.

DRAFT NEW QUESTION [AAC/11]

PLANNING PARAMETERS FOR THE BROADCASTING OF HDTV SOURCE SIGNALS IN NARROW-BAND TERRESTRIAL CHANNELS

The CCIR,

CONSIDERING

(a) the progress being made in bit rate reduction techniques;

(b) that the quality achievable with narrow-band digital emission systems is improving,

DECIDES that the following question should be studied:

1. what are the appropriate modulation and emission methods and their relevant parameters for the broadcasting of digitally encoded HDTV source signals in terrestrial narrow-band channels;

2. what are the appropriate methods to minimize multipath effects;

3. what are the frequency planning parameters for such service (minimum field strengths, protection ratios, planning constraints, those minimum receiver characteristics essential for frequency planning);

4. what are the required protection ratios between this and other TV systems;

5. what are the interference evaluation criteria to ensure compatibility with existing terrestrial television systems;

6. what is the relationship between emission coding parameters and spectrum efficiency?

Note - See also Questions AAA/11 and AAB/11.

FURTHER DECIDES that

1. the results of such studies shall be presented in the form of Recommendation(s);

2. the initial studies shall be completed during the study period 1990-1994.

DRAFT NEW QUESTION [AAD/11]*

OBJECTIVE MEASUREMENTS IN THE HDTV STUDIO ENVIRONMENT

The CCIR,

CONSIDERING

(a) that considerable progress in HDTV technology has been achieved and reported to the CCIR (see Report 801);

(b) that measurement of HDTV signal parameters, when such signals are generated and transmitted in a studio environment, is needed to evaluate the overall performance of HDTV studio chains or of parts of it;

(c) that it is of advantage when measurement methods are unified,

DECIDES that the following question should be studied:

1. what types of test signals and test patterns should be used for the measurement of performance in HDTV studio chains;

2. what methods should be recommended for measurements on those HDTV test signals and patterns;

3. whether in conformity with the spirit of Opinion 16 test signals, test patterns and measuring methods, specified in IEC Publications, would be appropriate for use in HDTV studio chains?

FURTHER DECIDES that

1. the results of the above studies should be included in (a) Recommendation(s);

2. the above studies should be completed within the study period 1990-1994 or 1994-1998 at the latest.

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* The Director of the CCIR is requested to bring this document to the attention of the IEC.

DRAFT NEW QUESTION [AAE/11]

APPLICATION OF VIDEO DISPLAYS IN A VARYING ASPECT RATIO ENVIRONMENT

The CCIR,

CONSIDERING

(a) that the conventional television systems employ 4:3 aspect ratio displays;

(b) that there is a worldwide agreement on a 16:9 aspect ratio in addition to the conventional 4:3 aspect ratio in addition to the conventional 4:3 aspect ratio;

(c) that 16:9 wide aspect ratio displays are becoming available;

(d) that 16:9 wide aspect ratio displays will also need to be used for the display of 4:3 aspect ratio images,

DECIDES that the following question should be studied:

1. what means could be employed in order to make an efficient use of the existing 4:3 aspect displays when 16:9 programs are being broadcast;

2. what means could be employed in order to make an efficient use of video displays, independent of aspect ratio, for presentation of transmitted/recorded multiple images?

Note - See Question 42-1/11, Report 1220.

FURTHER DECIDES that:

1. the results of the above studies should be included in (a) Recommendation(s);

2. the above studies should be completed within the study period 1990-1994.

DRAFT NEW QUESTION
[11-2/TEMP/3]

DIGITAL HDTV STUDIO INTERFACES

The CCIR,

CONSIDERING

(a) that Recommendation 601 has established the basis for digital coding standards for television studios both in countries using the 525-line system and in those using the 625-line system and that studies are proceeding on the additional standards for high-definition and enhanced quality television;

(b) that the practical implementation of Recommendation 709 requires definition of the details of various studio interfaces and the data streams traversing them;

(c) that such interfaces should, as far as possible, take advantage of the features already included in Recommendation 656;

(d) that it is desirable that interfaces be defined both in parallel and serial forms, for electrical as well as optical bearers;

(e) that it is desirable to investigate whether the specification should cover the possibility of conveying sound or any other ancillary signals through the interface, and should also address the need for synchronizing reference signals;

(f) that digital television signals produced by these interfaces may be a potential source of interference to other services and due notice must be taken of No. 964 of the Radio Regulations,

DECIDES that the following question should be studied:

1. what parameters are necessary to define standard digital interfaces for the signal sets covered by Recommendation 709, in both parallel and serial forms;

2. what parameters are necessary to define compatible optical fibre digital interfaces;

3. what are the parameters necessary to specify transport synchronizing signals;

4. what ancillary signals are required to be carried across the interfaces with the video signals, and what are the parameters necessary to define standards for these signals;

5. what provisions should be required for the associated digital sound channels;

6. should the parallel and serial digital interfaces have features in common with the corresponding aspects covered by Recommendation 656?

Note - See Recommendations 709, 601, 656 and Report 801, [draft new Report on harmonization] and Report 1088.

FURTHER DECIDES that

1. the results of the above studies should be included in (a) Recommendation(s);

2. the above studies should be completed within the study period 1990-1994.
