CCITT - CMTT - CCIR

ITU CO-ORDINATION MEETING

INTEGRATED VIDEO SERVICES (IVS) IN BROADBAND ISDN

Tokyo, 25 - 27 September 1991

SOURCE : ITU IVS CO-ORDINATION MEETING

SUBJECT: MEETING REPORT

1. INTRODUCTION

An ITU Co-ordination Meeting on Integrated Video Services (IVS) in Broadband ISDN was held in Tokyo, 25 - 27 September 1991 at the kind invitation of KDD. The meeting was chaired by Mr. A.M. Day (Vice-Chairman CCITT SGXVIII (B-ISDN), Australia) with official representatives from CCITT (SGs I, XV and XVIII), CMTT (TGs 2 and 3) and CCIR (SG 11). Representatives were also invited from IEC/ISO JTCI. A full list of representatives is contained in Annex 1.

2. BACKGROUND

The need to co-ordinate the standardization of video services, coding and broadband network capabilities has increasingly been recognized in the last two years due to:

- network developments which allow for the integrated support of a range of video service types (interactive, distribution and retrieval) and video qualities;

- increased interest in generic video coding to cover a range of video service qualities and hence types;

- increased terminal development to allow the support of multimedia services;

- the use of video services developed for one service sector being used in alternative service sectors.

Prior to this meeting, a meeting involving representatives of CCITT, CCIR and CMTT met informally in Matsuyama, Japan, 30 November 1990. The Matsuyama meeting clearly identified existing and potential areas of differences across each of the areas

involved with respect to timetables, technical base and service types. As a result, it was agreed to hold a broader based co-ordination meeting across CCITT, CCIR and CMTT on Integrated Video Services in B-ISDN.

As part of this co-ordination process, CCITT Study Group XVIII has developed an IVS in B-ISDN Baseline Document to facilitate the co-ordination of video coding and service issues in B-ISDN.

3. MEETING OBJECTIVES

The primary purpose of the meeting was to closely co-ordinate two main development areas, viz:

- standardization of network issues and video service/coding issues, to ensure similar availability timeframes and technical attributes;

- standardization across different video services and coding groups, to ensure consistency in technical base and service area to maximise commonality of systems and increase interworking capability.

To achieve this, each group was requested to indicate the technical basis, timeframe and directions on their Study Group's efforts on network, service and coding issues.

A list of the input documents to the meeting is contained in Annex 2, with the agreed agenda in Annex 3.

4. STANDARDISATION ACTIVITIES

4.1 General

These activities were divided into three areas:

- network related issues;
- coding related issues;
- service related issues.

The link and dependency between these issues is identified schematically in Figure 1. In particular, this diagram indicates simplistically the need for both service and network performance issues to be resolved prior to finalising video coding aspects. The treatment of these linkages are handled differently by the different standardization groups.

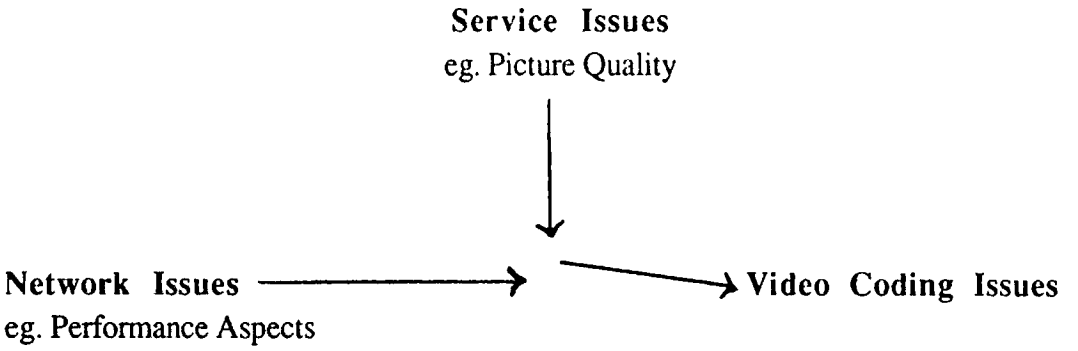


Figure 1. Network, Service and Coding Linkages

To provide a close link between network, service and coding aspects, a comparative timetable has been elaborated in Annex 4.

4.2 Network Related Issues

CCITT SGXVIII outlined the current status of developments in the standardisation of B-ISDN in CCITT. It was noted that CCITT has adopted a pragmatic, staged approach to B-ISDN standardisation recognising the different timeframes of standards being available. The following main points were noted:

- B-ISDN services will be carried in ATM cells.

- Transmission path diversity will be available in B-ISDN.

- Standards in 1992 will concentrate on a basic B-ISDN capability suitable for constant bit rate services, using peak rate network resource management and simple call control capabilities (eg. point to point). With respect to interworking, initially B-ISDN will provide only an end to end bearer capability for N-ISDN services.

- From 1994, this basic B-ISDN capability will be enhanced to allow variable bit rate services, statistical based network resource management and enhanced call control capabilities (eg. point-to-multi-point).

From a CCITT network perspective, a key aspect of this co-ordination process is to ensure timely availability of video service and coding capabilities coincident with network development, and to minimise the number of different systems required to support a range of different services.

4.3 Video Coding Issues

4.3.1 Task Group CMTT/2

Task Group CMTT/2 is responsible, amongst other activities, for developing systems for the secondary distribution of digital TV and HDTV over cabled networks, consistent with CCITT activities in B-ISDN. (Refer CCIR Report 1239 - Annex 5 contains the relevant extract.) As outlined in Annex 4, CMTT/2 is:

- addressing synchronous based systems, rather than ATM based systems;
- intend to specify constant bit rate solutions;
- as a result, the design will primarily use BER based performance parameters.

Task Group CMTT/2 has made a preliminary study of television transmission in an ATM network resulting in CCIR Report 1240. However, they are not currently addressing ATM based systems because of the uncertainty of the cell loss performance of ATM based networks. CMTT/3 are examining these issues with CCITT prior to CMTT/2 addressing ATM based systems.

Task Group CMTT/2 also requires input on the picture quality from CCITT SG11 required for TV and HDTV secondary distribution prior to completing their work. Currently it is expected that TG CMTT/2 will produce:

- TV/HDTV Codec Architectures in 1992;
- TV Codec Specification in 1994;
- HDTV Codec Specification in 1996.

4.3.2 CCITT SGXV ATM Video Coding Experts Group

This group is responsible for developing video codec standards for a range of video services over ATM based networks (eg. B-ISDN). As such, as outlined in Annex 4, this group:

- is concentrating solely on ATM based systems;
- still has to decide on whether CBR or VBR systems will be most suitable to standardise;
- anticipate solutions in the range up to several tens of Mbit/s, although concentration is likely on 5-10 Mbit/s;
- will cover conversational, distribution and retrieval applications;
- seek compatibility with H.261, MPEG2 and CMTT/2 (as depicted schematically in Annex 6, Figure 1)

CCITT SGXV do not have information on the picture quality required for different applications, nor on the cell loss performance of ATM networks. In the absence of this information CCITT SGXV:

- is addressing a family of codecs which will deliver the full range of CCIR subjective picture quality from 3.0 to 4.5. Table 1, Annex 6 shows SGXV's anticipated quality levels for different services applications;

- is assuming different BER and cell loss characteristics for ATM. Table 2, Annex 6 indicates the network performance characteristics currently being considered by CCITT SGXV in the absence of input from CCITT SGXVIII.

4.3.3 ISO/IEC MPEG

MPEG has three stages of video coding specifications related to Digital Storage Medium:

- MPEG 1, defined in 1990, at 1.5 Mbit/s;
- MPEG 2, scheduled for 1994, up to 10 Mbit/s;
- MPEG 3, 1993-1995, at ~40 Mbit/s for high resolution TV systems.

As MPEG standards are primarily targetted for DSM applications, they are not specifically transmission based. As such, the impact of ATM cells and transmission are not addressed.

The work of MPEG has, until recently, been conducted in IEC/ISO JTC1/SC2/WG11. Recently this work, together with other audio, picture and multi/hypermedia coding issues has been moved to a new sub-committee, SC29. Annex 7 outlines the establishment of SC29.

4.3.4 CCIR SG11

CCIR SG11 is responsible, amongst other activities, for the video coding for terrestrial and satellite broadcast video. In addition to specific coding for these applications, a new Working Party 11B has been established to address Generic Compression Coding aspects across terrestrial/satellite and Cable/ISDN Secondary Distribution (which is the specific responsibility of CMTT). ATM and B-ISDN are not being specifically addressed. This and other coding responsibilities are shown in Annex 8.

4.4 Service Related Aspects

4.4.1 CCIR SG11

In addition to the above, CCIR SG11 has been asked by CMTT to define the picture quality suitable for secondary distribution of transmission signals. CCIR SG11 is in the process of initiating studies to inform CMTT of the picture quality required for secondary distribution to allow CMTT to complete their coding activities.

4.4.2 CCITT SGI

CCITT SGI is responsible for services aspects of communication services over the telecommunications network. This includes the standardisation of Stage 1 service descriptions (and a newly proposed Stage 0) from a user perspective. For video services, SGI is responsible also for defining the quality required for the services it defines. However, currently no mechanism exists to assess the picture quality available through different codecs for communication services. This issue has been referred to CCITT SGXII which has responsibility for Terminal Performance isues. The absence of such a methodology constrains CCITT SGI's capability to define video services picture quality, and in turn, partially, CCITT SGXV's coding requirements.

5. ISSUES RAISED AND AGREED ACTIONS

As a result of the presentation and discussions associated with the different groups involved in IVS co-ordination the following issues were identified. In each case, actions and responsibilities were identified and agreed by the meeting:

ISSUE A CMTT/2's current work on video coding for secondary distribution is based on STM systems and is related to BER performance. This aspect of CMTT/2 work is not consistent with B-ISDN network developments requested by the 1988 CCITT Plenary Assembly (refer Annex 5). CMTT/3 remains the primary body in CMTT currently addressing ATM based issues.

Action 1: This issue should be brought to the attention of the CMTT at its next meeting in November 1991.

Responsibility:
- Convenor, ITU Co-ordination Meeting (Mr A. Day)
- Chairman, TG CMTT/3 (Mr A Brown)

ISSUE B CMTT/2 requires input on the picture quality required for secondary distribution (from CCIR SG11). In addition, to allow TG CMTT/2 to address ATM based coding systems, input is required on the anticipated cell loss performance and other characteristics of ATM based networks (from CCITT SGXVIII).

Action 2: CCIR SG11 to advise CMTT of the picture quality required for secondary distribution of television signals.

Responsibility: Chairman of CCIR WP11B (Mr Nishizawa)

Action 3: CCITT SGXVIII to provide advice to TG CMTT/2 (through CMTT/3) on ATM network performance capabilities. To assist this process, a list of required input information from SGXVIII is contained in Annex 9.

Responsibility: Vice Chairman CCITT SGXVIII (B-ISDN) (Mr A. Day)

ISSUE C Similarly, CCITT SGXV ATM Video Coding Group require input on the picture quality required for various communicative video services, and input on anticipated cell loss performance and other characteristics of ATM based networks. In the absence of these inputs, SGXV will develop an ATM based codec standard with assumed initial cell loss performance characteristics.

Action 4: As per above Action 3

Responsibility: Vice Chairman CCITT SGXVIII (B-ISDN) (Mr A. Day)

ISSUE D CCITT SGI is responsible, amongst other matters, for determining service performance and picture quality for communicative video services. However, it was noted that no mechanism exists to quantify picture quality for these services. CCITT SGXII is responsible, amongst other matters, for terminal performance and the development of such methodology. CCIR's subjective measurement methods represents a possible starting point to this analysis.

Action 5: This issue to be brought to the attention of SGXII

Responsibility: Chairman of CCITT WP I/3 (via Mr W. Gerfen)

ISSUE E CCIR SG11 is addressing both specific coding for terrestrial and satellite broadcasting, as well as generic coding to include secondary distribution. ATM video coding is currently not included in studies in CCIR SG11. This, together with CMTT's main interest in STM based secondary distribution, and CCITT SGXV's emphasis on ATM based systems, may continue to produce different coding solutions across different delivery media and service types. Account must be taken of the need for harmonisation between coding for different delivery systems (eg. ISDN, terrestrial emission, and satellite emission).

Action 6: Issue to be raised at the next CCIR SG11 and CMTT meetings in November 1991.

Responsibility: CONVENOR, ITU IVS Co-ordination Group (Mr A. Day)
Chairman, TG CMTT/3 (Mr Brown)
Chairman, CCIR WP11/B (Mr Nishizawa)
Chairman, CCITT SRXV ATM Video Coding Experts Group (Mr Okubo)

ISSUE F Work on video service harmonisation, whilst initiated for broadband services, should not be constrained by artificial narrowband and broadband barriers. In time, such barriers will not exist within networks nor with respect to the user or the service. As such, harmonisation of video aspects should extend across narrowband and broadband aspects, clearly necessitating network and service interworking.

Action 7: Issue to be brought to the attention of CCITT SGXVIII re interworking and CCITT SGXV re compatibility.

Responsibility: Vice Chairman, CCITT SGXVIII (B-ISDN) (Mr A. Day)
Chairman, CCITT SGXV ATM Video Coding Experts Group (Mr Okubo)

ISSUE G Although primarily addressing video aspects, the group noted that similar harmonisation efforts are required for audio signals as well, as most video services will have associated audio signals.

Action 8: Issues to be brough to the attention of CCITT SGXV (WP's 1&2) with respect to communicatiive services.

Responsibility: Chairman, CCITT SGXV Video Coding Experts Group (Mr Okubo)

ISSUE H It was noted that a range of additional activities on image and video issues is being undertaken in IEC/ISO, and that it is desirable to access information from these areas. It was agreed that the recently established Sub-committee 29 of IEC/ISO JTC1 would be the most suitable liaison point between these groups and the ITU Video Co-ordination Group.

Action 9: Convenor , ITU IVS Co-ordination Group to write to Convenor IEC/ISO JTC1 SC29 requesting SC29 to liaise with other IEC/ISO bodies and report to ITU IVS Co-ordination Group.

Responsibility: Convenor, ITU IVS Co-ordination Group.

ISSUE I The meeting recognised that the relationship between this ITU IVS Co-ordination activity and the formal co-ordination responsibilities (ie. Decision 18/16 of CCIR and JIWP CMTT-10-11/2 is unclear and requires resolution.

Action 10: Issue to be raised through CCITT to clarify relationships.

Reponsibility: Convenor, ITU IVS Coordination Meeting.

ISSUE J The meeting agreed that the IVS Baseline document should continue to be used to assist in the harmonisation of video network service and coding issues.

Action 11: It was agreed that SGXVIII should maintain the editorial role under the guidance of specific inputs from relevant areas, with the objective of updating it twice a year. A new annex on acronyms and glossary for terms used in the Baseline document should be added.

Responsibility: SGXVIII - re editorial role on new Annex. (Mr D Dorman)
All areas re input to IVS Baseline document.

ISSUE K It was noted that confusion still exists on the use and meaning of the term multimedia services, and that this confusion will impact the co-ordination role of this group.

Action 12: Watching brief only, subject to satisfactory progress in CCITT SGI, XVIII and IEC/ISO JTC1 SC29.

6. FUTURE ACTIVITIES

The meeting agreed that three future activities should occur:

(a) A broader based IVS Technical Workshop should be held to allow greater exposure of the technical issues associated with video network, service and coding aspects, and to promote technical discussion and co-ordination at the expert rather than official administrative level. The IVS Technical Workshop should allow significant discussion opportunity as well as the transfer of technical information. An initial input is provided to Annex 10. A workshop of two to three days in approximately six to nine months time was nominated.

Responsibility : Convenor, ITU IVS Co-ordination Meeting

(b) A further ITU IVS Co-ordination meeting should be held in 12-18 months time to review and co-ordinate the status, basis and direction of related video network, service and coding issues. This should take account of Issue I and Action 10 of Section 5.

(c) The IVS Baseline document should continue to be updated as a result of inputs from this meeting and groups involved in video network, service and coding issues.

LIST OF REPRESENTATIVES

CCITT SG XV

Mr. S. Okubo (NTT, Japan)	: Chairman of ATM video coding experts group
Mr. M. Wada (KDD, Japan)	: Chairman of Japan's committee for ATM video coding experts group

CCITT SG I

Mr. W. Gerfen (DBP TELEKOM, Germany)	: Representing Mr. R. Ruggeberg (DBP TELEKOM, Germany) Chairman of WP I/3
Mr. M. Matsumoto (NTT, Japan)	: Representing Mr. R. Smith (NYNEX, USA) Rapporteur of Q.22

CMTT/2 and 3

Mr. A. Brown (EBU, UK)	: Chairman of CMTT/3
Mr. H. Murakami (KDD, Japan)	: Vice-chairman of CMTT/2

CCIR IWP 11/9

Mr. H. Tanimura (Sony, Japan)	: Vice-chairman of IWP 11/9

CCIR SG 11

Mr. T. Nishizawa (NHK, Japan)	: Chairman of WP 11B

ISO/IEC JTC1/SC29

Mr. H. Yasuda (NTT, Japan)	: Convenor of JTC1/SC29
Mr. T. Hidaka (JVC, Japan)	: Representing Mr. L.Chiariglione (CSELT, Italy) Convenor of JTC1/SC29/WG11 (MPEG)

CCITT SG XVIII

Mr. A. Day (Telecom Australia)	: Chairman of WP XVIII/8
Mr. D. Dorman (Telecom Australia)	: Editor of IVS baseline document
Mr. A. Hare (BT, UK)	: Representing Mr. S. Alexander (BT, UK) Liaison Rapporteur to CMTT
Mr. D. Kostas (GTE, USA)	: Representing Mr. A. Reilly (Bellcore, USA) Vice-chairman of Committee T1
Mr. K. Yamazaki (KDD, Japan)	: Rapporteur of Q.22

LIST OF DOCUMENTS

TOK-1	Co-ordination meeting on IVS in B-ISDN (Invitation letter, including draft agenda)	Vice Chairman CCITT SG XVIII (B-ISDN)
TOK-2	IVS Baseline Document	CCITT SG XVIII
TOK-3	Meeting objectives (Copy of transparency)	CCITT SG XVIII
TOK-4	Overview of IVS co-ordination (Copies of transparencies)	CCITT SG XVIII
TOK-5	Video studies and B-ISDN standardization workplan in SG XVIII	CCITT SG XVIII
TOK-6	Standardization of B-ISDN (Copies of transparencies)	CCITT SG XVIII
TOK-7	Status of ATM Adaptation layer (AAL) studies in SG XVIII	CCITT SG XVIII
TOK-8	WG 11 status report	ISO/IEC MPEG
TOK-9	CMTT/2 activities for secondary distribution of TV and HDTV	CMTT/2
TOK-10	Status report of ATM video coding standardization	CCITT SG XV
TOK-11	Establishment of ISO/IEC JTC1/SC29	ISO/IEC JTC1/SC29
TOK-12	Guide for CCITT and ISO/IEC JTC1 cooperation	ISO/IEC JTC1
TOK-13	Role of SG I	CCITT SG I
TOK-14	The harmonization of standards for HDTV between broadcast and non-broadcast applications	CCIR IWP 11/9
TOK-15	Questions of CCIR SG 11	CCIR SG 11

TOK-17	Activities of CCIR SG11	CCIR SG 11
TOK-18	Copies of transparencies	CCITT SG XV
TOK-19	Copies of transparencies	ISO/IEC MPEG

ANNEX 3

Co-ordination Meeting on Integrated Video Services (IVS) in B-ISDN

25 - 27 September 1991, Tokyo

DRAFT AGENDA

1. Welcome
2. Meeting Objectives
3. Overview of IVS Co-ordination
4. Presentation on B-ISDN Standardisation Work Plan
5. Presentation of Video Services Work Plans
   - TG CMTT/2
   - TG CMTT/3
   - CCIR SG11
   - CCIR IWP 11/9
   - CCITT SGXV ATM Video Coding Experts Group
   - CCITT SGI
   - IEC/ISO MPEG
6. Status of IVS Baseline Document
7. Scope and Contents of IVS Baseline Document (Including clarification of responsibilities)
8. Timetable for IVS Related Standards
9. Report of Meeting
10. Other Business
11. Future Activities

ANNEX 4

STANDARDISATION TIMETABLES

The attached timetables represent simplistically the anticipated availability of standards related to video network, service and coding activities. The full detail of these tables can be found in the relevant reports of the Study Groups (these references to be added at a later date).

STANDARDISATION TIMETABLE 1 - CCITT SGXVIII

1. CCITT SGXVIII Network Capability	1992	1994	1994+
	Basic B-ISDN Capability (Release 1)	Enhanced B-ISDN (~Release 2)	Full B-ISDN Capability (~Release 3)
1.1 STM/ATM	- ATM	- ATM	- ATM
1.2 CBR/VBR	- CBR	- CBR & VBR	- CBR & VBR
1.3 Bit Rate	- 155 Mbit/s UNI User Rate <135.631 Mb/s	- 622 Mbit/s UNI Max Payload 599.040 Mb/s	
1.4 Design Features	- Peak rate only	- Statistical multiplexing	
1.5 Service Types	- point-to-point	- Point-to-Multipoint (multicasting) - Multipoint - Distribution	- Broadcast
1.6 Other Features	- Connection oriented & connectionless services - VCC Switched - VPC Semi-permanent	- Cell Loss Priority - Multi connections per call - Renegotiation within call - VPC Switched	- Multimedia capability
1.7 Interworking	- Connectionless (802.6) - Limited N-ISDN	- Full N-ISDN interworking	
1.7 Dependencies	CCITT SGI - Stage 1 Service Descriptions CCITT SGXI - Stage 2 & 3 Service Descriptions CCITT SGXV - QOS & NP Required	Same as 1992, plus CMTT/2&3 - QOS Requirements	As per 1994

STANDARDISATION TIMETABLE 2 - TG CMTT/2

2. TG CMTT/2 Digital Secondary Distribution	1992	1994	1994+
2.1 STM/ATM	STM	STM	?
2.2 CBR/VBR	CBR	CBR	?
2.3 Bit Rate	?	?	?
2.4 Design Features	Constrained by service & network performance	Constrained by service & network performance	Constrained by service & network performance
2.5 Service Types	TV/HDTV Codec Architecture	TV Codec Specification	HDTV Codec Spec. (1996)
2.6 Other Features	-TV/HDTV coding compatibility issue unresolved - CCIR Rec 721,723 compatability		
2.7 Interworking			
2.8 Dependencies	CCIR SG11	CCIR SG11	CCIR SG11

STANDARDISATION TIMETABLE 3 - CCITT SGXV

3. CCITT SGXV ATM Video Coding Experts Group	1992	1994	1994+
	Outline Recommendation	Recommendation completed	
3.1 STM/ATM		ATM	
3.2 CBR/VBR	Decision on CBR/VBR	CBR and/or VBR	
3.3 Bit Rate		Range up to several tens of Mbit/s	
3.4 Design Features		- Universal coding (in terms of services, quality resolution, application and bit rate) - extension capability to HDTV quality	
3.5 Service Types		- Conversational - Distribution - Retrieval	
3.6 Other Features		Compatibility with H.261, MPEG 2 and CMTT/2	
3.7 Interworking		Terminal interworking	
3.8 Dependencies		CCITT SGXVIII - AAL Spec CCITT SGXVIII - QOS and network performance CCITT SGI - Stage 1 Service Descp MPEG - Generic Coding CMTT - Secondary Distribn Coding	

STANDARDISATION TIMETABLE 4 - CCIR SG11

4. CCIR SG11 Digital terrestrial and satellite TV broadcast	1992	1994	1994+
4.1 STM/ATM 4.2 CBR/VBR 4.3 Bit Rate 4.4 Design Features 4.5 Service Types 4.6 Other Features 4.7 Interworking 4.8 Dependencies	**SEE NOTES BELOW**	APPROVAL OF RECOMMENDATIONS	

Notes: 1. ATM not included in current studies
2. Timing for and scope of standards for digital terrestrial and satellite TV distribution to be considered at the November 1991 CCIR SG11 meetings.

STANDARDISATION TIMETABLE 5 - MPEG

5. MPEG Digital Storage Media (DSM)	1992	1994	1994+
		MPEG 2	MPEG 3
5.1 STM/ATM		(not transmission based)	
5.2 CBR/VBR		CBR and/or VBR	CBR and/or VBR
5.3 Bit Rate		up to 10 Mbit/s	Up to 40 Mbit/s
5.4 Design Features		Generic Coding	Generic Coding
5.5 Service Types		Digital VTR Digital Disc Cable TV	High resolution TV Systems (HDTV)
5.6 Other Features			
5.7 Interworking			
5.8 Depedencies		TG CMTT/2 CCITT SGXV	

STANDARDISATION TIMETABLE 6 - CCITT SGI

6. CCITT SGI Stage 1 Service Descriptions	1992	1994	1994+
Broadband connection oriented bearer service	Recommendation F.811		
Broadband connectionless bearer service	Recommendation F.812		
Broadband video telephony service	Recommendation F.722		
Broadband video conference service	Recommendation F.732		
Broadband TV distribution service	Recommendation F.821		
Broadband HDTV distribution service	Recommendation F.822		
Broadband videotex service	Recommendation F.310		

Annex 5.

REPORT 1239

STANDARDS FOR DIGITAL SECONDARY DISTRIBUTION SYSTEMS

(1990)

1. Introduction

Secondary distribution must be understood as the delivery of television programmes to consumers. Particular attention must be paid to the digital delivery of television signals over future Broadband Integrated Services Digital Networks (B-ISDN) which will be used for both communicative and distributive services including a whole range of visual services from videotelephony to television distribution according to future high definition standards.

Historically, it was the realization of this trend which caused the CMTT, at its Interim Meeting in 1987, to propose a change in its terms of reference, so that its perceived responsibility for studying digital delivery of television programming especially over optical fibre networks would be unequivocally resolved. The CCITT formally approved the proposed change at its IXth Plenary Meeting held in Melbourne, October 1988, subject to certain provisos [CCIR, 1986-90a].

To ensure that these studies are aligned with those on the broadband ISDN, the Plenary Assembly decided that CMTT should undertake its projected video coding studies for secondary distribution with the objective of consistency with the broadband ISDN being specified in CCITT Study Group XVIII and with coding for videotelephony in CCITT Study Group XV. Consistency with the video coding for broadcasting services should also be considered.

Different picture transmission requirements have hitherto led to the consideration of different bit rate reduction algorithms for each application and each transmitting channel. For instance, CCITT Study Group XV, IWP CMTT/2 and the ISO have proposed often similar but not identical algorithms for videotelephony, television contribution and distribution and still picture transmission respectively.

Greater compatibility between bit rate reduction algorithms will be required for the secondary distribution of pictures (mainly, but not exclusively in the broadband ISDN).

2. Interconnection requirements

There is already an increasing need for interconnection between services and many administrations require the new HDTV service to be compatible with the television service, i.e., for a television receiver to be connectable to an HDTV source as cheaply as possible. This need is likely to develop with the arrival of new visual services in the user's premises (still pictures,

ANNEX 6

CCITT SGXV NETWORK PERFORMANCE AND QUALITY RANGE ISSUES

The following material has been supplied by CCITT SGXV ATM Video Coding Experts Group as their working material related to:

- Service integration through ISDN (Figure 1)
- Range of applications and related technical aspects associated with the group's Coding aspects (Table 1)
- Service and Network requirements considered by SGXV (Table 2)

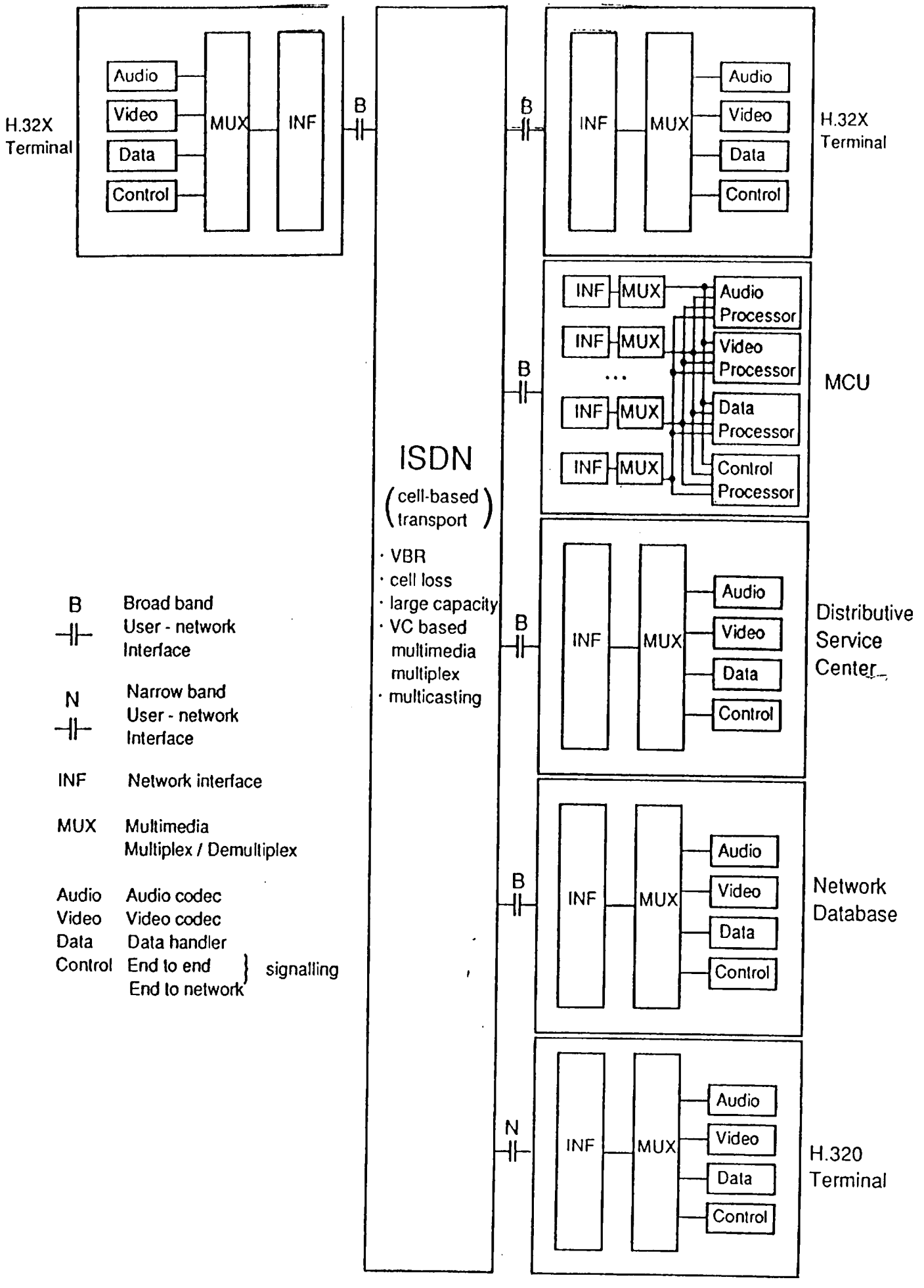


Figure1 Service integration through ISDN

Table 1 Matrix of applications and technical issues

Tech. issues / Applications	Network	Storage media	Resolution	Quality objective	Delay
Video conference	N,B-ISDN LAN	-----	CIF ~ CCIR601	~ 3.5	Short
Video conference with wide screen	B-ISDN LAN	-----	EDTV ~ HDTV	~ 3.5	Short
Video conference with multi-screen	B-ISDN LAN	-----	CIF ~ CCIR601	~ 3.5	Short
Videophone	N,B-ISDN LAN	-----	CIF ~ CCIR601	~ 3.5	Short
Video surveillance	N,B-ISDN	----	QCIF/CIF ~CCIR601	3~4.5	Mid
TV broardcasting	DBS CATV-net	-----	Current TV ~ HDTV	~ 4.5	Mid.
Video distribution on storage media	B-ISDN LAN	Disk Tape	Current TV ~ HDTV	~ 4.5	Mid.
Video database	N,B-ISDN LAN	Disk Tape	CIF ~ HDTV	~ 3.5	Long
Videotex	N,B-ISDN LAN	Disk	CIF ~ HDTV	~ 4.5	Long
Video mail	N,B-ISDN LAN	Disk	CIF ~ CCIR601	~ 3.5	Long
Video instruction	B-ISDN LAN	Disk	Current TV ~ CCIR601	~ 4.5	Mid.

note-1: The Quality grade is refered to the follwoing:

Quality	Impairment
5 Excellent	5 Imperceptible
4 Good	4 Perceptible, but not annoying
3 Fair	3 Slightly annoying
2 Poor	2 Annoying
1 Bad	1 Very annoying

note-2: The"Long Delay"means even non-realtime transmission is acceptable.

Table 2 SERVICE AND NETWORK REQUIREMENTS

Service	Bit rate	QOS requirements (***)	Required BER/CLR without error handling in AAL	AAL type	Required BER/CLR after single bit error correction on cell basis in AAL (*)	Required BER/CLR after single bit EC on cell basis and addit. cell loss correction in AAL (**)
Communication						
videophone	64kbps/2Mbps FBR (H261)	30 min error free	BER<1.e-6 CLR<1.e-7 (BCH(511,493) FEC in user layer)	type 1	in user layer	BER<... CLR<8.e-5
videophone	2Mbps VBR	30 min error free	BER<3e-10 CLR<1e-7	type 2	BER<1.2e-6 CLR<1e-7	BER<2.3e-5 (CLR=1e-6) CLR<8e-5
videoconference	5Mbps VBR	30 min error free	BER<1e-10 CLR<4e-8	type 2	BER<8e-7 CLR<4e-8	BER<1.8e-5 (CLR=1e-6) CLR<5e-5
videodistribution						
TV distribution	20-50Mbps VBR	2 hours error free	BER<3e-12 CLR<1e-9	type 2	BER<1.2e-7 CLR<1e-9	BER<6e-6 (CLR=1e-6) CLR<8e-6
MPEG1 core	1.5Mbps VBR	30 min error free	BER<4e-10 CLR<1e-7	type 2	BER<1.4e-6 CLR<1e-7	BER<2.5e-5 (CLR=1.e-6) CLR<9.5e-5
MPEG2 core	10Mbps VBR	30 min error free	BER<6e-11 CLR<2e-8	type 2	BER<5.4e-7 CLR<2e-8	BER<1.5e-5 (CLR=1.e-6) CLR<4.e-5

(*) Payload scrambling polynomial 1+x**43 produces double, correlated bit errors.
(**) Based on parity cell built from 31 consecutive data cells (see further in annex 1). The cell losses are assumed to be isolated. With this simple correction scheme, single cell losses can be corrected if combined with cell loss detection by cell numbering. Also non-corrected but detected bit errors in a cell are handled by replacing this faulty cell by a dummy cell followed by correction of this cell by the cell parity mechanism. The BER calculations are done in the assumption that all double ATM link errors (2 times 2 correlated errors due to payload scrambling) can be detected.
(***) QOS requirements, as visualized by viewers; not directly related to channel errors.

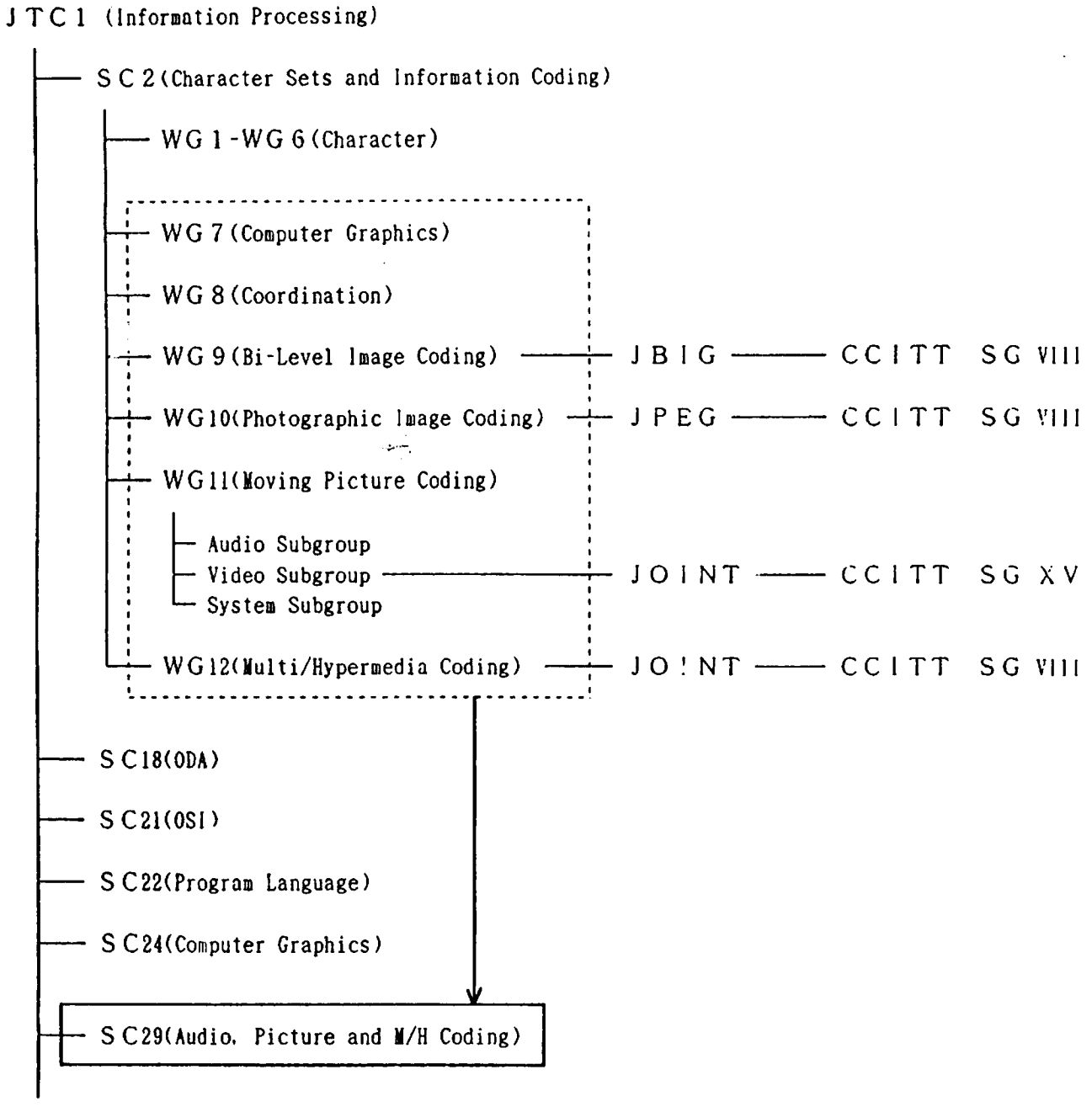
Notes

- These values are calculated under the assumption that cell losses are isolated. If cell losses tend to occur successively, another cell loss ratio and another cell loss correction technique may be required.

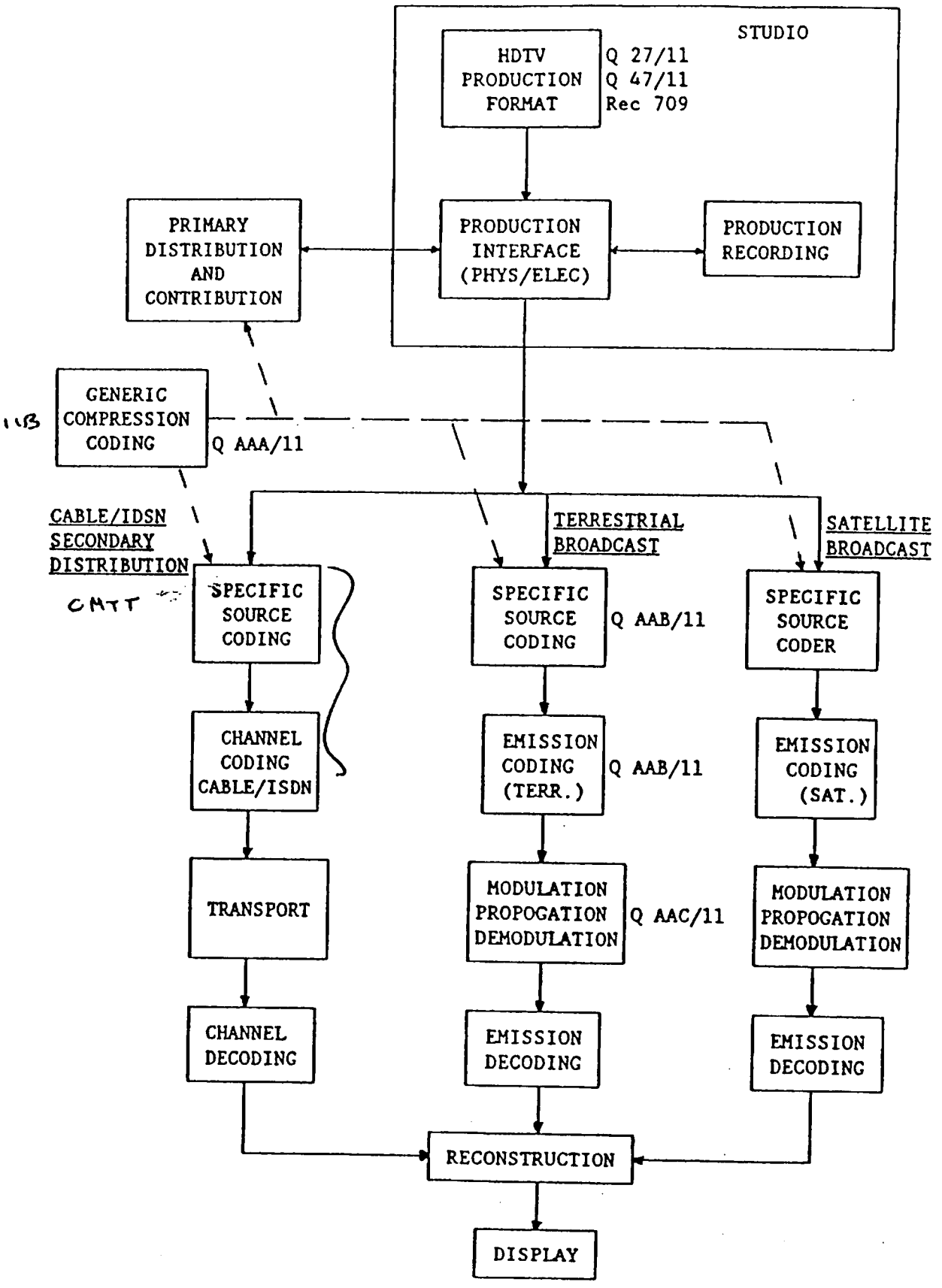
- We assumed that one cell loss always causes a picture degradation. The visual perception of the picture, however, may be acceptable even if cell loss concealment technique is not used. Therefore there is a possibility that these requirements will be relaxed.

ANNEX 7

ESTABLISHMENT OF SC 29 IN IEC/ISO JTC1 AND WORKING GROUP STRUCTURE



HDTV (and other Television) Broadcast Chain Functional Diagram, also indicating CCIR 11 Responsibilities (Source: CCIR SG11)



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

ANNEX 9

URGENT QUESTIONS ON NETWORK CAPABILITIES FROM VIDEO CODING STUDIES

The following questions briefly summarize some of the current issues of fundamental importance for defining the architecture and parameters of the video coding to be used for transmission on the B-ISDN. For full details of the questions, the following documents should be consulted;

-CCIR Report 1240 (Television transmission in an ATM based network), Recent liaison statement from CCIR TG CMT/3 to CCITT SG XVIII.

- TOK-10, Status report on ATM video coding standardization, issue (CCITT SG XV)

Note - (H) indicates items of the highest priority for 1992 B-ISDN standards.

PART A: Questions common to CBR and VBR

1. (H) What is the likely value of cell loss ratio?

If the cell loss ratio is rather low (e.g. once in a 10 hour communication session), we believe that the transmission coding alone, either at AAL or higher layer, can cope with cell loss. If the cell loss ratio is extremely high, some technique for cell loss resilience is required for video source coding. Currently CCITT, CMTT, ISO/IEC intend to select a video source coding at the beginning of 1992. It becomes difficult to implement cell loss resilience technique for source coding algorithm after that date. The link between cell loss and the support of VBR services requires clarification.

2. What merit can we expect by using CLP bit?

There are some techniques, such as layered coding, which are suitable for using both priority classes. Whether we adopt these techniques or not, however, depends on their expected merit. What degree of network resource saving can be obtained by using low priority cells?

3. (H) What is the expected BER for the cell payload? Is it different from that of existing networks?

4. What provisions will be made for the end-to-end transfer of timing information? What clocks are available to the terminal?

5. For audiovisual communications including video, associated audio(s), auxiliary data etc. we may use one VC for each signal. What is the limit on differential delays among different VCs. Are there any means to bound cross VC (i.e. cross media) delay?

6. What information (if any) is fed back from the network to the user during the call to indicate network congestion? We may adopt the video coding to make best use of the bit rate available.

PART B: Question particular to CBR

7. (H) How does B-ISDN intend to provide transparent N-ISDN digital signals transfer especially those for cell-sensitive and delay-critical services such as visual telephone using H.261 (video coding), H.221 (multimedia multiplex) etc.? It is noted that existing video coding for N-ISDN has been designed without ragard to cell loss.

PART C: Questions particular to VBR

8. In addition to the peak cell rate, what parameters are likely to be adopted for VBR support?

9. What UPC mechanism is expected for VBR support? What averaging intervals can be used to monitor mean? Longer intervals (significantly greater than a video frame period of typically 30 - 40 ms) are preferred for video services.

ANNEX 10

Proposed topics for the IVS Technical Workshop

In order to extend the progress in IVS studies and relevant standardization, it will be beneficial for an exchange of views by experts of various fields involved. The IVS Co-ordination meeting agreed that an IVS Technical Workshop would be ta useful mechanism to facilitate such activities. Particularly, it will provide an opportunity for terminal and network experts to meet together , each taking account of emerging standardization and implementations.

Various topics can be presented and discussed at the Technical Workshop, but generally talks should be restricted to technical considerations. The following are provisionally proposed topics to assist the objectives above;

1. Codings for ATM based B-ISDN

   Source coding/decoding and transmission coding/decoding, taking account of ATM specific features such as cell loss and per-cell priority control.

2. Network capabilities to support IVS

   ATM Adaptation Layer, benefit of statistical multiplexing, cell traffic control and network resource management.

3. Network performance and QOS

   Cell loss ratio, cell transfer delay and jitter, assessment methods for picture quality.

4. Services and applications

   Interactive / retrieval / messaging, distribution or broadcasting, and storage services and applications. Charging implications.

5. Multimedia aspects

   Implications of multimedia from various viewpoints including services, applications, terminals and networks.
