

Source : Chairman of the Experts Group for ATM Video Coding
Title : List of open issues, Version 2
Purpose : Discussion

This document has been made in response to the action point identified during the discussion of work plan at the Ipswich meeting (see §9/AVC-398R). The following category is used;

- A. Framework for video coding standardization
- B. Picture format
- C. Video coding
- D. VBR vs CBR
- E. Interface with networks
- F. End-to-end signalling
- G. Multipoint communication system
- H. B-N interworking
- I. Audio coding

Modifications to Version 1 (AVC-436) are indicated with a bar on the left of a table cell.

It is assumed here that the earliest occasion of making our Recommendations will be through approval of ITU-TSS SG15 in January 1995. For this target, we need substantially fixed drafts at the May 1994 Working Party meeting.

The date of fixing the H.26X|MPEG-2 "Main" is now clear, but others including for "extensions" are rather vague. The dates listed are to stimulate your consideration. Please note that we need a target date for the minimum total system Recommendations, preferably it should be the same as that for H.26X. Our study will greatly contribute to better planning of ITU-TS SG 15.

The following is some material to help reviewing the attached list of open issues .

1. System configuration

According to the practice of N-ISDN standardization, Recommendations in Figure 1 are assumed. Dotted partitions between multimedia multiplex and AAL etc. are intended to represent the current ongoing discussion.

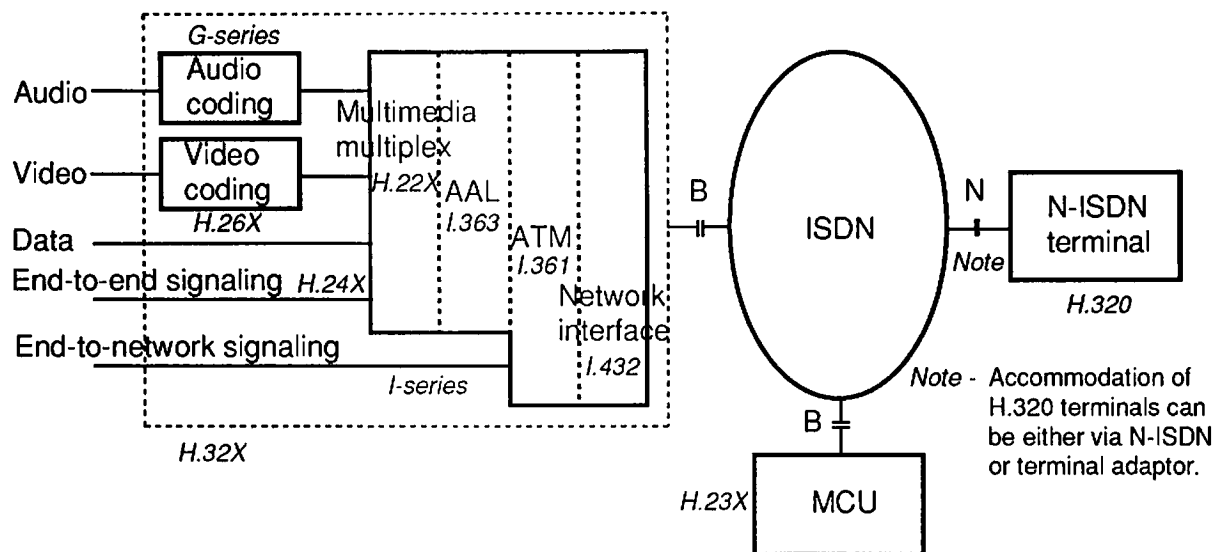


Figure 1 Audiovisual communication terminal and system configuration

2. Applications

C: Conversational e.g. videophone and videoconferencing
D: Distributive e.g. cable television
R: Retrieval e.g. data base access
M: Messaging e.g. video version of e-mail

3. Milestones

Note - Exact dates for the ITU-TS SG 13 (former SGXVIII) release 2 and 3 are subject to the SG 13 considerations.

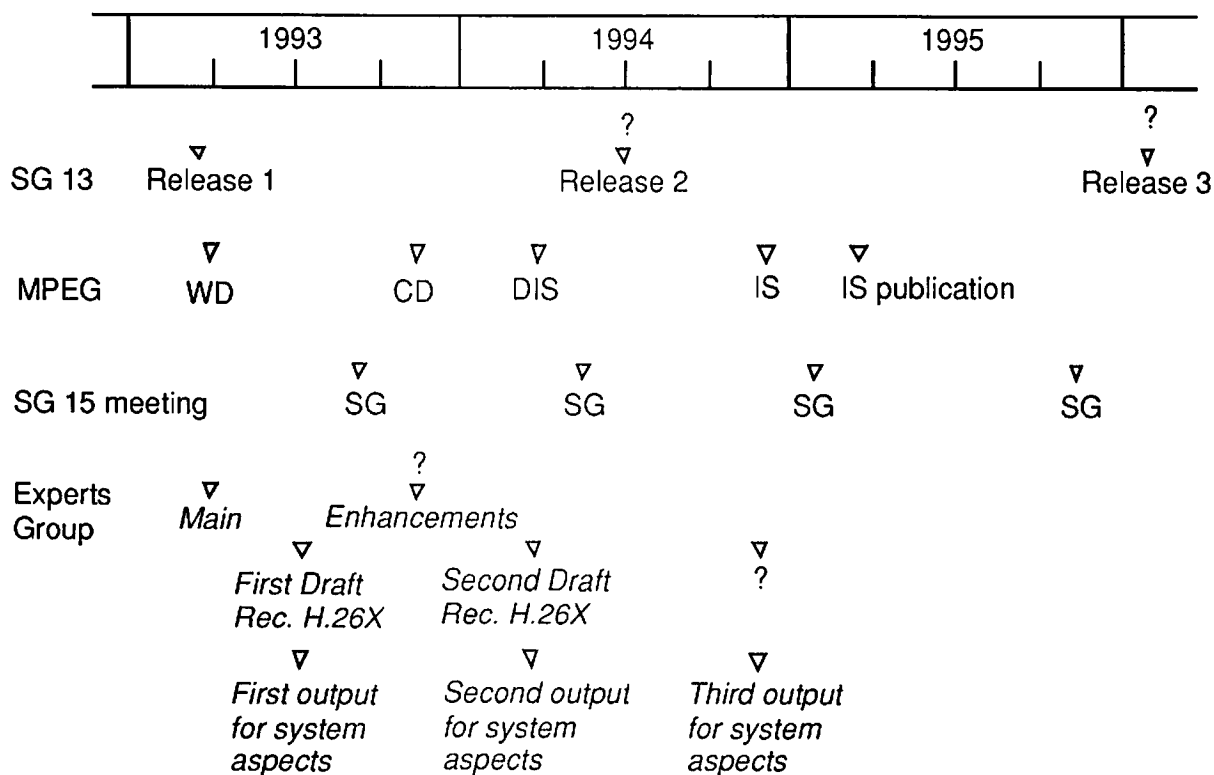


Figure 2 Timetable

The following is a precedent of T.81|ISO 10918-1 (JPEG);

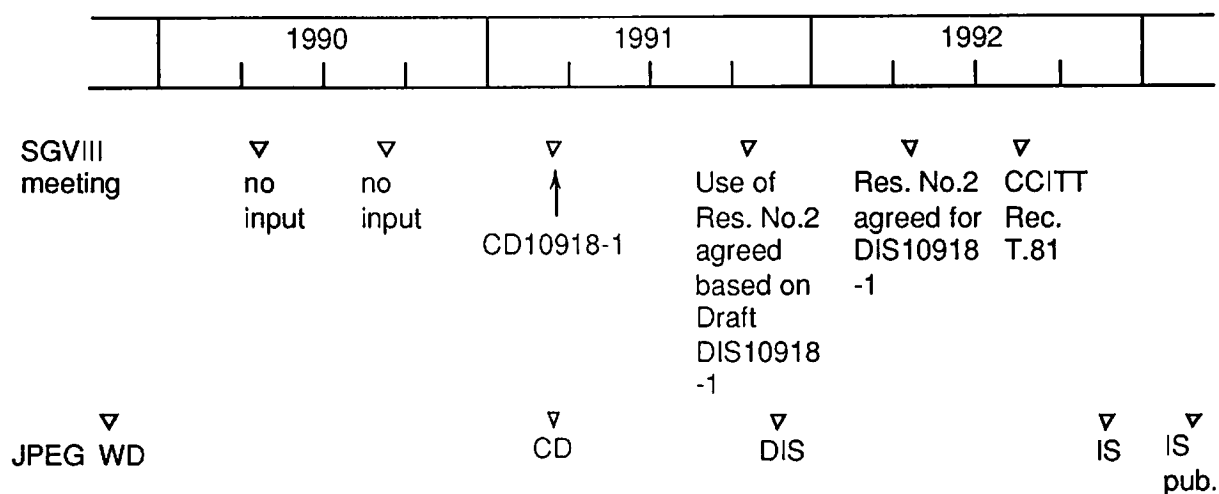


Figure 3 JPEG precedent

3. Target date (priority)

Stage	Item	Network standardization	Target date for freezing specifications
Stage 1	Common text for H.26x MPEG-2 (Main Profile at Main Level)		Mar 1993
Stage 1+	Common text for H.26x MPEG-2 (Enhancements)		Nov 1993 (?)
Stage 2	Minimum configuration for the total audiovisual communication system	Release 1 (1992) - CBR - point-to-point - limited N-ISDN interworking	Mar 1994 (?)
Stage 3	Enhanced configuration for the total audiovisual communication system	Release 2 (1994) - CBR and VBR - multicasting, multipoint, distribution - renegotiation within call - full N-ISDN interworking	~1995 (?)
Stage 4	Full configuration for the total audiovisual communication system	Release 3 (1994+) - Broadcasting - Full B-ISDN	????

4. References

AVC-109	Status report on video coding standardization - Issue 2, §15
AVC-177R	Report of the Yokosuka meeting
AVC-206R	Report of the Singapore meeting
AVC-256R	Report of the Stockholm/Haifa meeting
AVC-317R	Report of the New Jersey/Rio de Janeiro meeting
AVC-355R	Report of the Tarrytown meeting
AVC-357	Status report on video coding standardization - Issue 3
AVC-374	Contribution to Work Plan (Australia)
AVC-398R	Report of the Ipswich/London meeting
AVC-448	IVS Baseline Document, January 1993

END

List of open issues
February 1993

A. Framework for video coding standardization

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
A.1	Structure of H.26X	- Common text with MPEG-2 - Separate Rec.	Common text approach has been agreed at WPXV/1 and MPEG	- Relation with CMTT and CCIR standardization	H.26X	All	cleared	- \$4.8/AVC-402 - MPEG Roma Resolution
A.2	Profile	- Main and extensions - Level	- Main Profile has been almost defined in Roma - Other profiles and levels are under discussion	- Feedback from audiovisual communication system consideration	H.26X	All	Mar 1993	- MPEG93/237
A.3	Hardware verification	- Essential for finalizing the Recommendation	Open, an action plan is to be fixed	- Volunteers to make hardware codec - Provision of testing procedures and necessary equipment - Provision of testing environments (network or simulator) - Tentative specifications for elements other than video coding	H.26X	All	Mar 1994?	

B. Picture format

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
B.1	Coded picture format	- Single format (SCIF) for CCIR601 class - Multiple formats	- Agreed to adopt the generic multiple format approach - Support of multiples of 16 pels horizontally and vertically in Main Profile		H.26X	All	Cleared	- \$5.2/AVC-398R - MPEG93/237
B.2	Operating format(s) of the terminal	- Flexible spatial and temporal formats inside an agreed maximum - Small subset - Single fixed format	Open	- Applications - Coding efficiency, delay, hardware complexity - Picture quality degradation due to conversion - Availability of progressive equipment	H.32X	All for the integrated service terminals	~1994	
B.3	Standards conversion (for information purpose)	- Spatio-temporal filters	Open	Filter design appropriate for terminals	H.32X	C, R, M	~1994	

C. Video coding

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
C.1	Low delay mode	- Picture structure - Intra refresh method - Scene change handling - VBV	Mostly worked out by experiments	- Semantics for skipped picture type - VBV delay consideration - Interaction with "Systems" - Confirmation that Main Profile include all the necessary tools for low delay operation	H.26X	C, D	Mar. 1993	Appendix H /AVC-400
C.2	Cell loss resilience	- Concealment (decoder only and encoder assisted) - Structured packing or reduced slice size - Cyclic intra refresh - Leaky prediction - Use of priority (CLP, QoS) - Layered coding using different QoS (spatial / frequency scalability, use of data partitioning)	Open (under experiments)	- Network performance - Comparison among alternatives - Description of recommended methods for a given CLR	H.26X I.361 (AAL, cell seq. num.)	C, D, M (channels will be error free for Messaging by use of retransmission protocol)	- Main related source coding: Mar 1993 - Others: by Nov. 1993	- Annex 3 to AVC-443R (MPEG93/214)
C.3	Leaky prediction	- Picture quality - Coding efficiency - Limit cycle fix - Channel hopping	Open, awaiting solution(s) for the noisy background	- Technical solutions for the noisy background - Comparison with other alternatives in cell loss resilience and channel hopping	H.26X	C, D, R	Mar 1993	

C.4	H.261 compatibility	- Embedded coding - Simulcast - Switchable	- Agreed that the H.32X terminal be interworkable with the H.320 terminal - A specific method for H.26X is under experiments	- System consideration - Coding efficiency improvements by spatio-temporal weighting, etc. - Experiments for 30 Hz CIF base layer and 25 Hz 601 upper layer - Upsampling filter design - Multiplexing method - Complexity assessment	H.32X H.26X	C, (R?, M?)	Nov 1993?	
C.5	Frequency scalability	- Use of 8x8, 4x4, 2x2 DCTs - Frequency scanning	Open (under experiments)	- System consideration to apply this functionality to the AV communication system	H.26X H.32X	C?, D, R, M	Nov 1993?	
C.6	Bitstream interchange between different applications	- A small number of defined profiles	Open (under discussion)	- Definition of profiles, Main Profile in particular	H.26X H.32X	All	Nov 1993?	

D. VBR vs CBR

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
D.1	Network loading model	- Simplified model - Improved model	- Basic understanding has been obtained by the simplified model	- Better representation for auto- and mutually-correlated sources, source periodicity, etc. - Study on a heterogeneous traffic mix	→			
D.2	VBR advantage in picture quality	- Constant perceived quality - Stepwise CBR	- No clearly visible evidence at higher bit rates	- Quality improvements under UPC constraints - Statistical multiplexing gain - Priority utilization - Desired UPC mechanism - Coding rate control method - CAC (Connection Admission Control) strategies	→			CAC strategies require input from SGXVIII
D.3	VBR advantage in delay	- Leaky bucket or sliding window as UPC	- Advantageous for the leaky bucket UPC	- Policing mechanism of the network	→			
D.4	VBR elements in the source coding	- VBV delay - coding control	- VBR is in Main Profile	- Necessary syntactic elements	→		Mar 1993	
D.5	Video coding mode for B-ISDN	- CBR - VBR	Open, but CBR is a degenerate case of VBR	- Tariffing principle	H.32X	All	~1994	

E. Interface with networks

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
E.1	Video clock recovery	- Use of AAL functions - Time stamps and buffer fill information - Use of B-ISDN high quality clock	- Agreed that this functionality be not included in ATM specific part - Open for the solution	- Solution for retrieving stored video through the network - Impacts of VBR	H.26X, H.22X, H.32X?	All	Mar 1993 (if to be specified in the H.26X core)	
E.2	Multimedia multiplexing	- User multiplex (bit oriented or packet oriented?) - CS multiplex - SAR multiplex - VC multiplex	- VC multiplex is agreed as the long term goal - Open to the initial stage solution (to study these options in parallel until network characteristics are clarified) - Use "MPEG System" as far as possible	- Network conditions (cell loss, cost of separate VCs, differential delay between VCs, B-N interworking) - Cross media synchronization method - Number of video, audio, data and control channels, including multi-layered cases - Consideration of commonality across applications, terminal interworking - Service enhancements (through separate handling of media) - Effect of cell loss - Applicability of MPEG Systems to AV communication	H.22X	All	~1993	- Current cell loss experiments are only for video mono-medium. Full user multiplex is untested. - Annex 1 to AVC-402 - Liaison response of MPEG Systems in Roma
E.3	Bit error correction / resilience	- Correction in video - Correction in media specific part - Retransmission	Open	- Characteristics of transport and storage media - Multimedia multiplexing method	H.26X I.361	C, D, R*	~1993	*) Application M may use retransmission

E.4	Cell loss correction / resilience	- Transmission coding - Source coding	Open	- Partition of necessary functions - Requirements to AAL - Multimedia multiplexing method	H.26X I.361		~1993	
E.5	AAL	- Appropriate type(s) for AV services	Open for video transport (cell sequence numbering is essential???) Open	- Functional requirements from audiovisual signal transport	I.361	All	~1993	
E.6	Impacts of LAN	- Environments independent of B-ISDN - LAN as NT2	Open	- Characteristics - Clock timing recovery method	H.32Z?	All	~1993	

F. End-to-end signaling

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
F.1	Communication procedures	- Extension of H.242 (use of BAS codes)? - New method	Open (related to the selection of multimedia multiplex method)	- Channel to be used - Protocols - Interworking with N-ISDN terminals - Switched service provision - Enhanced signalling features offered by B-ISDN	H.24X		~1994	Communication with SGXI may be necessary regarding appropriate partitioning between end-to-end and end-to-network signalling

G. Multipoint communication system

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
G.1	Video processing	- Switched video - Continuous presence	Open	- Handling of mixed B and N terminals - Methods to implement continuous presence	H.26X H.23X	C	~1994	

H. B-N interworking

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
H.1	Adaptation/extension of H.320 terminals for B-ISDN accommodation	- Network adaptation only - Network adaptation plus modifications of the existing codec	New item	- Configuration of B-ISDN adapter - Modifications to H.261?	H.32Y?	C, R, M	~1994	- §11/AVC-443R
H.2	Provision in B-ISDN terminals	- Emulation of the N-ISDN terminal	Agreed that B-N interworking is mandatory	- Configuration of the B-ISDN terminal implementing full stack of protocols	H.32X	C, R	~1993	
H.3	Cell loss critical existing terminals	- AAL arrangements - Selection of QoS	Open	- Characteristics of B-N connections	H.32X	C, R	~1994	

I. Audio coding

#	Issue	Options	Status	Inputs required	Aimed Rec.	Applications C/D/R/M	Target Date	Note
I.1	Algorithm appropriate for ATM	- Use of existing standards (G.711, G.722, G.728 etc., MPEG audio, etc.) - New development	Open	- Bit rate - Audio quality - Delay (high quality and low delay coding is required for conversational services) - Cell loss resilience	G.7XX	All	~1994?	Responsibility of WPXV/2