

Source : Chairman of the Experts Group for ATM Video Coding
Title : List of open issues
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 the draft version dated 28 December 1992 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 SGXV 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 "core" 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 SGXV.

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.

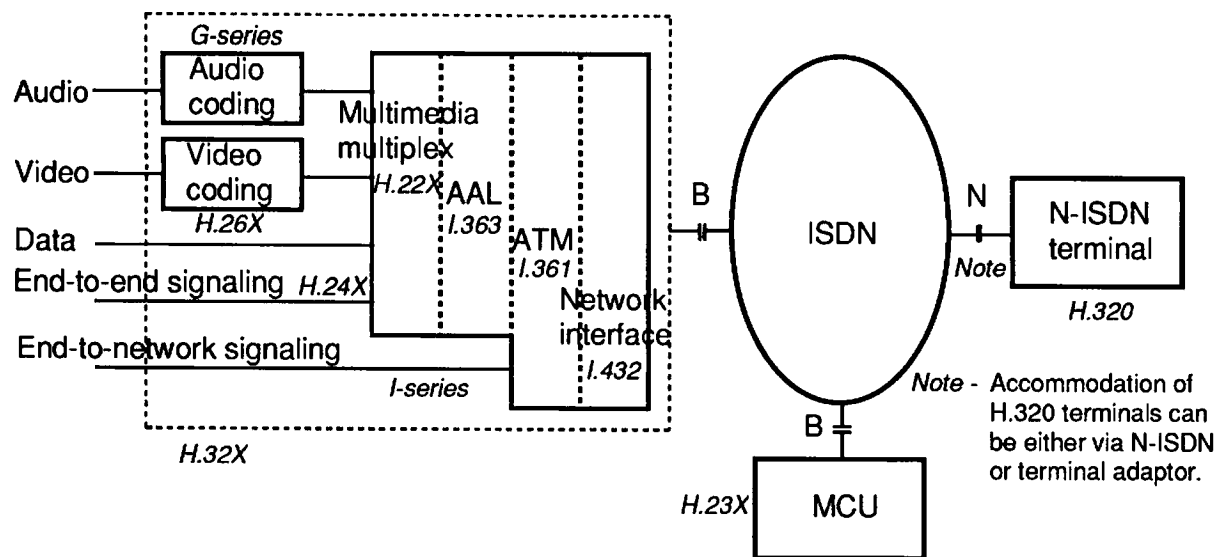


Figure 1 Audiovisual communication terminal and system configuration

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 - Dates for the SGXVIII release 2 and 3 await outcome of the Jan.1993 meeting.

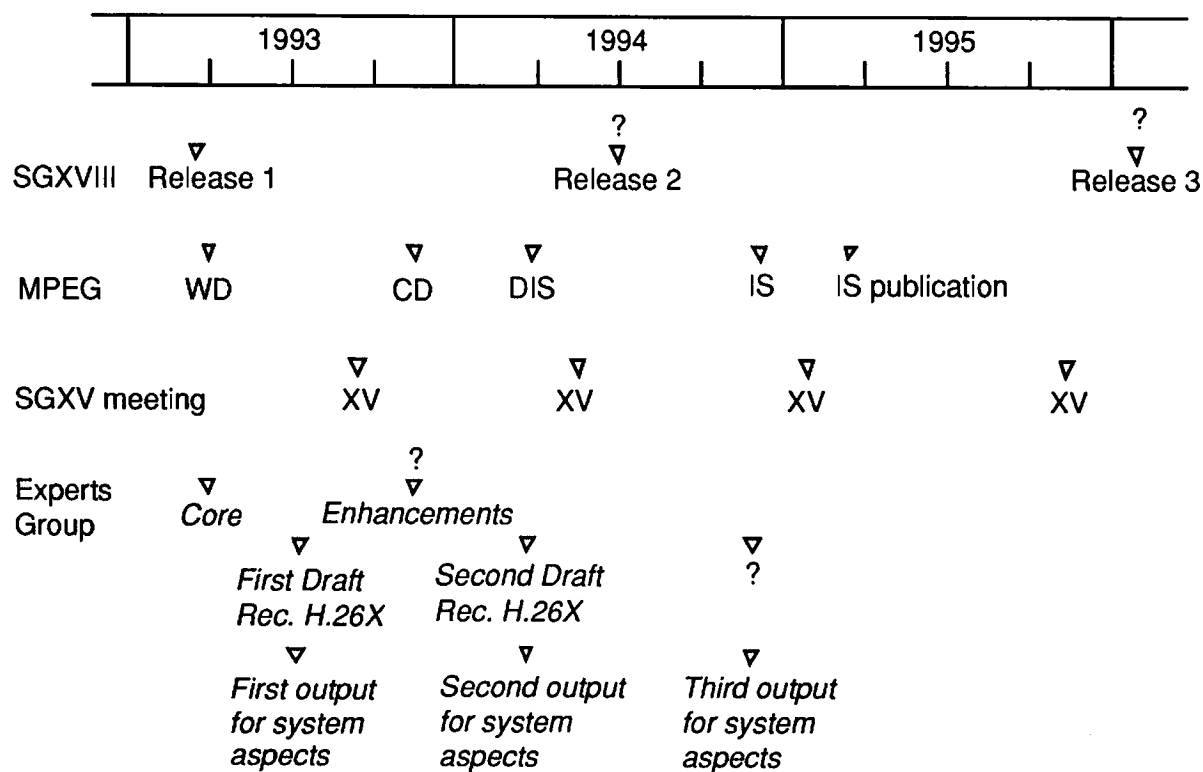


Figure 2 Timetable

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

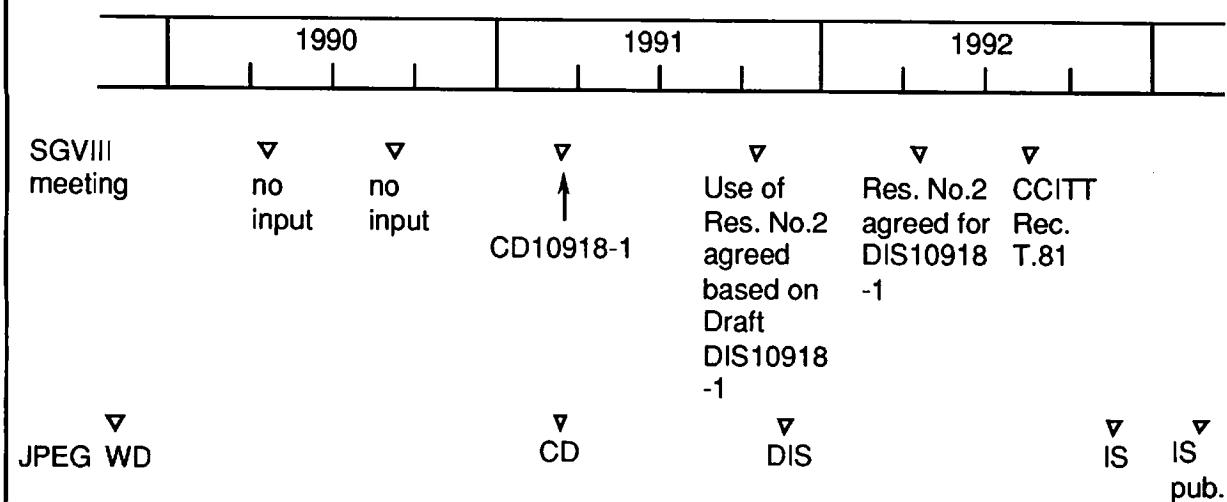


Figure 3 JPEG precedent

3. Target date (priority)

Stage	Item	Network standardization	Target date for freezing specifications
Stage 1	Common text for H.26x MPEG-2 (Core profile)		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

END

List of open issues

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	- Relation with CMTT and CCIR standardization	H.26X	All	Mar 1993	\$4.8/AVC-402
A.2	Profile	- Core and extensions - Level	Under discussion	- Feedback from audiovisual communication system consideration	H.26X	All	Mar 1993	
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		H.26X	All	Cleared	\$5.2/AVC-398R

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 informatin 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	H.26X	C, D	Cleared	Appendix H /AVC-400
C.2	Cell loss resilience	- Concealment - Structured packing or reduced slice size - Cyclic intra refresh - Leaky prediction - Use of priority (CLP, QoS) - Layered coding using different QoS (spatial / frequency scalability)	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)	Mar 1993	
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?)	Mar 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, core 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 (Access Control) strategies - Policing mechanism of the network	↓			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.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)	- 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	H.22X	All	~1993	Current cell loss experiments are only for video mono-medium. Full user multiplex is untested.
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 - Effect of cell loss	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???)	- 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 adaptor - Modifications to H.261?	H.32Y?	C, R, M	~1994	
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 - Characteristics of B-N connections	H.32X	C, R	~1993	
H.3	Cell loss critical existing terminals	- AAL arrangements - Selection of QoS	Open		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