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

SOURCE : JAPAN
TITLE : Consideration about ATM Coding Applications and Features
PURPOSE : Discussion

Some Video coding standards for constant bitrate (in conjunction with rate buffer) are now or will soon be ready for practical use, and we are going to work for ATM Video coding to realize wider applications and better features, so that it can fully utilize projected high speed digital transmission/storage media.

We, JAPAN, intend to get higher resolution and quality up to High Definition TV level with ATM video coding rather than the current CIF level.

Prior to work for actual coding algorithm, it is necessary to consider and define the applications and features to be achieved. In this document, the applications and technical terms are first clarified and then the relationship between applications and technical issues is discussed.

1. Applications

1.1 Communications with realtime bidirectional transmission

- (1) Video conference
- (2) Videophone

1.2 Video distributions

- (1) TV program distribution
(e.g. broadcasting TV, local area TV, corporate TV)
- (2) Moving picture distribution by digital storage media
(distribution of pre-recorded video disk or tape, and
video gathering for disk or tape through network)

1.3 Interactive Video accesses

- (1) Video database
- (2) Videotex
- (3) Video mail
- (4) Video instruction
(note: the program includes interaction with the user)

2. Possible digital transmission/storage media

2.1 Communication

- (1) B-ISDN, N-ISDN
- (2) LAN, Private network
- (3) CATV network

2.2 Storage

- (1) Digital optical/magnetic disk
- (2) Digital magnetic tape

3. Picture resolutions and qualities

3.1 Resolution and average bitrate

There are various kinds of picture format with respect to the spatial and temporal resolutions, and the scanning method (interlaced or non-interlaced signals), and also there can be various kinds of average bitrate closely related to the picture resolutions and qualities. In term of picture format, we should consider about picture formats of the current TV broadcasting, Film and Free-format (Computer use). Followings are examples of the spatial and temporal resolutions to be considered with estimated average bitrates.

- (1) CIF and similar signals (non-interlaced): up to several Mbit/sec
 - 360 x 288 x 29.97 /sec
 - 360 x 240 x 29.97 /sec
 - 360 x 288 x 25 /sec
- (2) Current broadcasting TV(Interlaced): up to several 10s Mbit/sec
 - 440 x 240 x 2 x 29.97 /sec
 - 440 x 288 x 2 x 25 /sec
- (3) CCIR-601 (Interlaced): up to several 10s Mbit/sec
 - 720 x 240 x 2 x 29.97 /sec
 - 720 x 288 x 2 x 25 /sec
- (4) EDTV (Wide aspect ratio / 16:9): up to several 10s Mbit/sec
 - 960 x 240/288 x 2 x 30/25 /sec
 - 960 x 480/576 x 60/50 /sec (Pseudo non-interlaced)
- (5) High definition with wide aspect ratio: up to 100 Mbit/sec
 - 1920 x 540 x 2 x 30 /sec
 - 1920 x 540 x 2 x 25 /sec
 - 1920 x 1080 x 24 /sec (films)

3.2 Quality grading

The minimum quality and resolution of the reconstructed(decoded) picture will depend on the application and then we have to make clear the relationship between picture qualities and applications. The following is an example from CCIR-Rec-500 as for subjective assessment.

Table-1 Quality grading

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

3.3 Others

- (1) The average bitrate per channel and gross bitrate together with other channels should be considered focusing on the transmission efficiency of ATM networks.
(The more video channels per one transmission link, the better transmission efficiency of ATM networks)
- (2) It is noted that main target bitrate(s) are decided considering trade-off between network cost and terminal cost neither of which is known at the moment. We should be flexible on this point.
- (3) When we discuss 'picture formats', it is necessary to distinguish those of the input picture (before encoding), coding picture (processed by coder and decoder) and output picture (on displaying).

4. Matrix of applications and technical issues

To make it easier and clearer to consider the relationship between applications and technical issues, the matrix of those will be useful. The following matrix is an example.

Table-2 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
TV broadcasting	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 referred to Table-1.

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

This matrix is a simplified example as our starting point, so that other terms should be added with clear definition.