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

Document AVC-51
May 23-31, 1991

SOURCE : JAPAN
TITLE : Requirements for the high quality video coding standard H.26X
- Consideration of multipoint systems, distribution services and future enhancement.
PURPOSE : Discussion

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1. INTRODUCTION

We considered the following items as part of the study for the framework of the new coding standard H.26X:

- interconnectability among different types of terminals in multipoint systems and the possibility of layered coding,
- intraframe coding with a view to distribution type networkcast services,
- backward compatibility and adaptibility to future enhancement.

This contribution describes the results of the discussion which took place, and discusses the items that should be considered as requirements for H.26X.

2. INTERCONNECTABILITY IN MULTIPOINT SYSTEMS, AND POSSIBILITY OF LAYERED CODING

Intercommunication among different types of terminals should be possible through an MCU (Multipoint Control Unit) in multipoint systems. Some terminals may be connected to the B-ISDN, while others to the existing ISDN.

The following parameters should be clarified for multipoint systems in B-ISDN:

(a)bit rate.
(b)picture format.
(c)conversational services/distributive services.
(d)classification of terminals and inter-class connectability.

Recommendation I.211 suggests layered coding as a means of connection between different services in B-ISDN. We point out that multipoint systems using MCUs can be an area where layered coding would be effective. Figures 1 and 2 give specific examples of multipoint interconnections, showing a case where all terminals are connected to B-ISDN and a case where terminals connected to N-ISDN are also involved, respectively. If two or more types of terminal are connected to an MCU, the signal processing performed by the MCU must be adapted to the capacity of these terminals. In the case of Figure 2, in particular, the coding algorithm may not be identical for terminal H.261 and terminal H.26X, so the signal processing carried out by the MCU would be more complex. To simplify this signal processing, the use of layered coding is being considered.

The following topics have also been identified for future consideration:

- classification of terminals and specific examples of interconnection in multipoint systems,
- problems when making interconnections, and clarification of the required criteria,
- assessment of layered coding.

3. INTRAFRAME CODING WITH A VIEW TO DISTRIBUTION TYPE NETWORKCAST SERVICES

In the case of networkcast services where moving images are broadcast over a network using B-ISDN, for example, the cost of the codec has a considerable effect on the cost of the system as a whole since the network part, particularly the subscriber line transmission part, would not be bit rate dependent and its cost would be relatively low.

We therefore propose to include the intraframe codec in the framework of the high quality video coding standard which is currently under discussion. Intraframe coding involves less processing than interframe coding, and it may therefore be possible to produce the codec with less cost. Other advantages of intraframe coding with regard to applications are the feasibility of random access of any frame in the video signal and frame (or field) time multiplexing of multiple video sources.

The following have been been identified as topics that should be considered concerning intraframe codecs.

(1)Efficiency of intraframe coding

In order to achieve high quality video coding as well as efficient usage of network resources, there is a need to implement the most efficient intraframe

coding mode in H.26X. As a target, less than 30 Mbit/s for example is required for each video channel if we assume not less than 4 channels are to be contained in a 155 Mbit/s B-ISDN interface.

(2)Consideration of coding control suitable for intraframe coding.

It is felt that the coding control system used in the H.261, MPEG-1 standard can also be applied to an intraframe coding codec. If any further points emerge from future discussions, they should be incorporated in video multiplexing specifications.

(3)Negotiation when communication begins.

The intraframe mode may also be specified for new high quality coding algorithms, and it may be possible to operate only in the intraframe mode. Problems will however arise when a decoder that can operate only in the intraframe mode is connected to a network. In this case, negotiation between terminals is necessary when communication begins.

The points below should be considered:

- provision of a communications protocol which informs the encoder that the decoder can operate only in an intraframe mode (protocol recommendations),
- control bit
  intraframe mode / intraframe + interframe mode
  as header information (coding recommendations).

4. BACKWARD COMPATIBILITY AND ADAPTIBILITY TO FUTURE ENHANCEMENT

For the time being, focus is on standard TV, but research is also being carried out on EDTV (enhanced TV) and HDTV. It is therefore envisaged that in future, there will be interconnections between these enhanced terminals and standard TV or existing terminals.

The following two methods have been identified with regard to such interconnections:

(a)The protocol will distinguish between existing terminals and enhanced terminals, which will communicate with each other in the highest common mode. Enhanced terminals must at least emulate "existing" terminals as a "fall back" mode.

(b)Signals from enhanced terminals will comprise "existing" parts and "additional" parts:

a start code for "existing part" + "existing part data"
a start code for "additional part" + "additional part data"

The decoder of existing terminals should ignore all data after the "additional" start code until the next "existing" start code is received. This method assumes that existing terminals can also receive data up to the same bit rates as enhanced terminals. With such a structure, further "additional" parts could be inserted in additional data as long as the "additional" start codes are identifiable for the "existing" codecs.

From the flexibility viewpoint, method (b) may be preferable. An example of this type of backward compatibility is found in H.261:

PEI+PSPARE, GEI+GSPARE

When defining a standard syntax, it is desirable that additional data can be defined by method (b) above, and even the initial products should be capable of understanding this.

5. CONCLUSION

We have pointed out that the following three items should be discussed and included in the requirements for the new high quality video coding standard H.26X:

- Realization of multipoint systems, taking into account possibility that layered coding may be a solution,
- Inclusion of an intraframe only video codec in the scope of the new standard,
- Consideration of the future enhancement by means of the syntax structure.

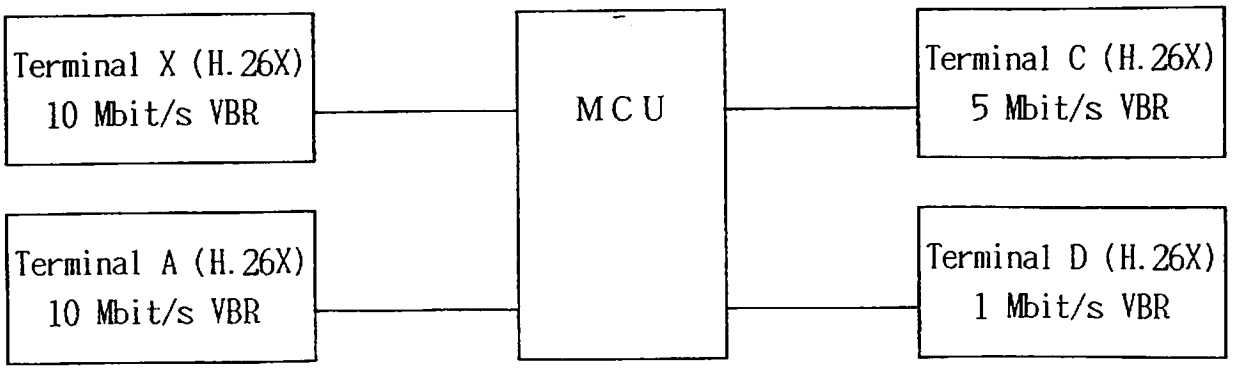

figure 1 Example of Interconnection Via MCU (1)

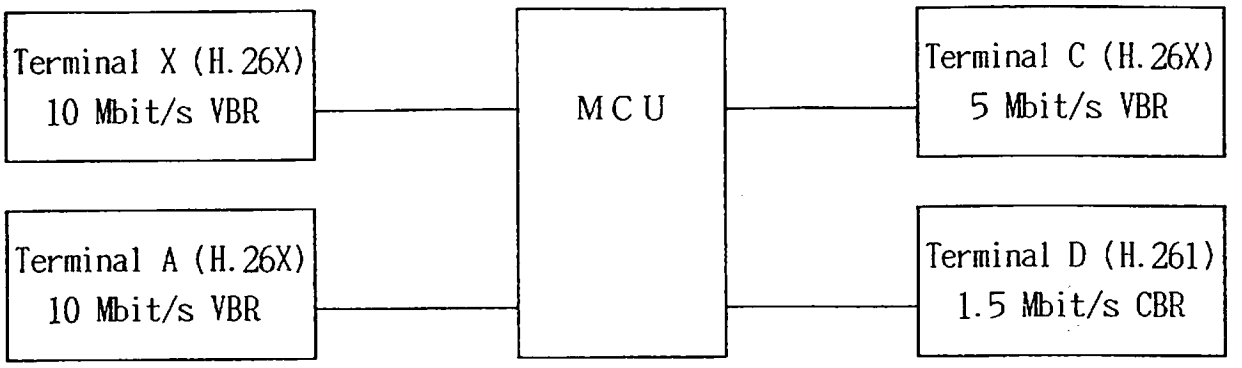

figure 2 Example of Interconnection Via MCU (2)