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1. Introduction

While transport stream packets of MPEG are currently under definition, the issue of their mapping on ATM has been raised. Discussions are going on in the ETSI/NA5 on this subject where some views have already been expressed. This paper presents the result of ongoing investigations in France Telecom.

2. Discussion

Different solutions for MPEG transport stream to be carried on ATM have been listed and discussed in a document from Bellcore (Ref 1.). In this document, two AAL types are considered : AAL 1 and AAL 5.

The AAL 5, which has been defined for services pertaining to Class C according to the I.362 classification, is not adapted to the transport of real-time signals. Therefore, its use for the transport of MPEG transport packets is not supported. On the other hand, the AAL 1 has been defined for Class A services (i.e. constant bit-rate services with real-time requirements), therefore it is suitable to MPEG transport. As a result, this paper only considers the use of the AAL 1 for that purpose.

It is reminded that the AAL 1 relies on a one octet dedicated field to perform its functions. Therefore the information field is 47 octet long.

In the Bellcore paper, four solutions are addressed. As it does not appear that other solutions should be envisaged, the discussion will only mention those solutions.

- solution A ("transparent") is not very interesting from the service point of view, although it is the most staightforward for ATM. Problems raise with cell loss containment and MPEG structure recovery.

- solution B ("alignment") which consists in aligning the beginning of a transport packet to a SAR-PDU, makes easy the transport structure recovery. The counterpart is the padding to be inserted in the last cell of the group of cells carrying one transport packet. The overhead (i.e. the amount of padding octets) should be kept as low as possible. Obviously the best matching between the transport structure and the ATM cell corresponds to a null padding. This should be aimed at.

- solution C ("pointer") is a reliable solution to recover the structure of the transport stream. It uses an AAL option primarily defined for circuit transport. The drawback of this solution is that in the case of cell loss, two MPEG transport packets may be damaged. Additional slight counterpart is the pointer overhead.

- solution D ("multiple packet") should be considered only if case B fails in getting a null padding. Same problems with cell loss than in A and C.

3. Proposal

According to our view, the best choice is solution B **with a null padding**. This solution enables ATM to transport the transport stream of MPEG in the best conditions. Both cell loss containment and transfer structure recovery are ensured. This leads to propose for the MPEG transport stream a packet length of n x 47 octets. If the MPEG transport packet sizes from 128 to 255 octets, then the values to be supported are : 141, 188, 235 octets. However, the value 94 octets should not be excluded too.

If it appears that it is not possible to match one of these values for the transport packet size, then we have to balance between solution B with padding (which is the acceptable padding overhead ?) and solution C. In the latter solution, cell loss containment is no longer ensured and so a cell loss correction mechanism may be of some help to the application. It is pointed out that a method has already been standardized in Rec. I.363 for video transport. If needed, a decision between B and C has to be taken depending on the transport packet size. This is the fall back possibility we support.

Solution D has to be considered only in the particular case where the MPEG transport packet size and the SAR-PDU payload are in a ratio enabling a small number of packets to be transported in an integer number of SAR-PDUs. However, this solution shows poorer capabilities than B in case of cell loss (2 packets may be transported in one cell).

Solution A should be considered only if the transport structure recovery is not required by the application, otherwise it should not be supported as it shows no other advantage than the simplicity from the ATM point of view.

4. Conclusion

For the transport of the MPEG transport packet stream in ATM networks, the use of the AAL1 is supported. Among different possibilities, the best capabilities are met when the MPEG transport packet size is an integer multiple of the ATM cell payload, i.e. 47 octets. This should be the target for MPEG. If this requirement is not fulfilled, then solutions with a pointer or with a padding are available, with reduced performances.

References :

(1) : ATM mappings of transport layer packets, Bellcore, MPEG Atlanta Meeting, May 1993.