

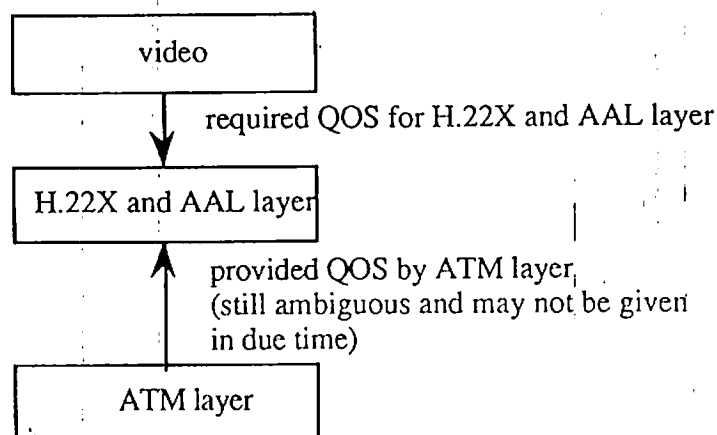
SOURCE : Japan
TITLE : AAL for hardware verification
PURPOSE : Proposal
Relevant sub-group: System

1. Introduction

H.22X/AAL has been discussed to derive an appropriate AAL for audiovisual services. Several H.22X/AAL alternatives were described in AVC-585[1]. The conclusion is that delay, error performance and efficiency should be discussed before adopting appropriate H.22X/AAL. This document proposes guidelines for selecting the AAL.

2. Network QOS and H.22X/AAL functionality

H.22X/AAL should convert QOS provided by ATM layer to QOS required by video, audio and data.



Both of required QOS for H.22X/AAL and provided QOS by ATM layer are ambiguous at the moment.

Table 1 shows network QOS and required H.22X/AAL functionalities. Table 2 shows an evaluation of H.22X/AAL alternatives in terms of delay, efficiency, implementation, and error resiliences.

Table1. Network QOS and H.22X/AAL functionality

Network QOS			adaptation layer functionality				
case	bit error ratio*1	cell loss ratio*1	bit error		cell loss		over all minimum functionality
			detection	correction	detection	correction	
1	low	negligible	○	—	—	—	bit error detection
2	medium.	negligible	○	○	—	—	bit error correction
3	low	low	○	—	○	—	bit error / cell loss detection
4	medium.	low	○	○	○	—	bit error correction / cell loss detection
5	low	medium.	○	—	○	○	cell loss correction
6	medium.	medium.	○	○	○	○	cell loss correction*2
7	low	high	○	—	○	×	bit error / cell loss detection
8	medium.	high	○	○	○	×	bit error / cell loss detection*3

negligible ; neither error detection nor error correction is necessary.

low ; error detection is necessary for concealment.

medium ; error correction is necessary.

high ; error correction is impossible. (for example; due to consecutive cell losses.)

○ ; necessary

— ; not necessary

× ; impossible

Note; we assume that a combination of negligible cell loss and high bit error ratio is not realistic in ATM environments.[2]

*1 ; the value may change depending on the service bit rate.

*2 ; cell loss correction provides bit error correction automatically.

*3 ; in this case cell loss occurs more frequently than bit error. Therefore bit error correction makes a little sense.

Table 2 Alternatives for H.22X/AAL[3][4]

solution		1	2	3	4	5
layer (*indicates multiplex)		PES packet* (modified?)	PES packet (modified?)	PES packet (modified?)	PES packet* (modified?)	PES packet (modified?)
		null	TS packet*	null	null	TS packet* + FEC
		AAL type 1 cell interleave		AAL type 4 SAR*	AAL type 5	new AAL (4 cells)
packing delay (upper; unsync. lower; sync.)*1		16 cells	16 cells	1 cell	PES packet	4 cells PES packet
packing efficiency (upper; unsync. lower; sync.)*1		91.74	89.79	91.67 87 approx.	96.4 approx. 91.6 approx.	95.83 82 approx.
implementation			2 stage mux hardware		popular in data transmission	2 stage mux hardware
resynchronization time after uncorrectable error		at least PES packet	16 cells?	1 cell	PES packet	TS packet
bit error		correction	correction	detection	detection	correction
cell loss		correction	correction	detection	detection	detection
available network QOS	1	○	○	⊙	⊙	○
	2	○	○	×	×	⊙
	3	○	○	⊙	⊙	○
	4	○	○	×	×	⊙
	5	⊙	⊙	×	×	×
	6	⊙	⊙	×	×	×
	7	×	×	⊙	⊙	○
	8	×	×	⊙	⊙	○

⊙ ; support minimum requirement

○ ; support minimum requirement + α

× ; cannot support minimum requirement

*1 ; sync. means that video structure (for example slice) is aligned with PES packet.

3. Discussion points

One transmission error per one hour at 5Mbps corresponds to bit error ratio; 6×10^{-11} or cell loss ratio; 2×10^{-8} . General feeling is that cell loss ratio of 10^{-8} is realistic for high QOS. On the other hand, bit error ratio of 10^{-11} sometimes may not be realistic.

Two services can be considered.

(1) Class A service

Transmission efficiency and easy implementation are given priority.

(For example; videophone using WS)

Bit error and cell loss corrections are not necessary while detections are necessary to prevent serious picture quality degradation. Solutions 3 and 4 in Table 2 are the alternatives. Solution 3 is superior in delay. On the other hand solution 4 is superior in transmission efficiency.

(2) Class B service

Video quality is given priority. (For example; broadcast)

In this service, bit error correction is mandatory. Solutions 1, 2 and 5 in Table 2 are the alternatives. Solutions 1 and 2 provide better quality in normal errors (cell loss is less than once per 16 cells), but lower quality in excessive errors. (at least 16 cells will be lost when consecutive cells are lost.) Solution 1 needs longer resynchronization time but does not need 2 stage mux hardware.

Which class is the first target of H.32X and which is the best AAL for that class should be discussed. However, real business requirements are not clear yet and discussion may take a long time. Therefore if we cannot reach the firm conclusion which is the best AAL until mid of 1994, we would like to propose to use existing an AAL for hardware verification. AAL type 5 LSI will be made available well in advance of the intended hardware trial time because AAL type 5 is popular in data transmission. When we use AAL type 5, transmission delay should be limited by putting the constraint on PES packet size. And AAL type 1 (cell interleave) may also be made available in due time.

4. Conclusion

There are at least two service classes and many AAL alternatives for audiovisual communication systems. The discussion should be continued. However, if we cannot reach a firm conclusion on the choice until mid of 1994, we would like to propose to use existing AAL for hardware verification because of easiness. It may be AAL type 5 or AAL type 1 (cell interleave).

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|--------------|------------|---|
| [1] AVC-585 | S. Dunstan | ATM network adaptation performance parameters |
| [2] AVC-524 | Japan | Bit error consideration on H.22X/AAL |
| [3] AVC-578R | Chairman | REPORT OF THE THIRTEEN EXPERTS GROUP MEETING IN BRUSSELS |
| [4] AVC-557 | SG13 | LIAISON STATEMENTS TO SG15 EXPERTS GROUP FOR ATM VIDEO CODING |