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TITLE : CONSIDERATIONS ON AC-LEAKY PREDICTION

PURPOSE : Proposal

Relevant sub-group : Video, Requirement

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## 1. Introduction

AC-leaky prediction is one of the open issues toward NEXT profile definition. In this document, previous experimental results are reviewed and it is proposed that AC-leaky prediction should not be included in NEXT profile.

## 2. Features of leaky prediction

### 2.1 Merits of leaky prediction

(1) Error resilience

At first, leaky predictions (AC-leaky and other leaky predictions) were introduced as a temporal error localization scheme. Leaky predictions have been claimed better in subjective performance than non-leaky methods by Intra Slice or Intra Picture updating, because the degraded picture will gradually recover. An increase of information amount and decrease of SNR is relatively small. (AVC-332,333)

(2) Channel hopping

(3) Random access

In these two cases, the presented picture by leaky prediction has also been claimed subjectively desirable and natural. (AVC-364)

### 2.2 Problems of leaky prediction

(1) Limit cycle (AVC-332)

→ This problem will be resolved by Solution 2 of AT&T proposal. (AVC-392)

(2) Noisy background (AVC-331,333)

→ Solutions by adaptive quantization have been presented. (AVC-455,456)

### 2.3 AC-leaky prediction

AC-leaky prediction may alleviate the above two problems. (AVC-413) Error resilience can be strengthened by shorter refresh cycle (ex. Ndc=6, Ndc=3) without remarkable lowering in SNR which is observed in Intra Slice or Intra Picture. (AVC-454)

However, AC-leaky prediction still has the following problems.

(1) Limit cycle remains in AC components.

(2) Background noise is not eliminated perfectly (in case of such lower bitrates as 4Mbit/s).

(AVC-456)

(3) There is a periodic coding bits fluctuation (about 10%) by DC Intra Picture.

## 3. Discussions

### 3.1 Merits and problems of AC-leaky prediction

It is characteristic of leaky prediction that picture quality recovers gradually once mismatch between an encoder and a decoder has take place due to e.g. transmission error, channel hopping, random access etc. This merit of leaky prediction in comparison with Intra Slice will be evaluated differently in each application, because the effect is subjective.

The drawback of using leaky prediction is an increase of both the complexity in hardware and the amount of processing.

The following techniques may be necessary to solve problems listed in 2.3.

(1) Limit cycle of AC components needs AT&T's Solution 2.

(2) Noisy background needs to be reduced by applying adaptive quantization.

(3) Though DC Intra Slice will be a solution to reduce the fluctuation in number of bits per picture, conventional rate control methods generate similar level of fluctuation even for the schemes without leaky prediction.

These (1) and (2) solutions make AC-leaky reduce the merit compared with other leaky predictions, and make hardware more complex.

### 3.2 Considerations from communication applications

For communication applications, the error resilience against cell loss is an important requirement. Intra Slice combined with short Slice will be adequate instead of AC-leaky prediction in area where CLR is less than $10^{-3}$.

In case of a switched multi point system, and at the beginning of a communication, the switching of video source may happen. These situations are very similar to channel hopping. As far as channel hopping can be served by Intra Slice, the same technique is applicable to communication applications as well. Furthermore, the method using the C&I signal of fast picture update is also applicable to two-way communication applications in B-ISDN in the same way as in N--ISDN environment (H.261/H.230/H.320/etc.).

## 4. Conclusions

This document has reviewed previously obtained results and discussed merits and problems of AC-leaky prediction. We have proposed that AC-leaky prediction is prefered to be outside NEXT profile and proposed the following alternatives, because Intra Slice (with short Slice) has a similar effect to AC-leaky prediction.

(1) AC-leaky predictio in not included in H.26X/MPEG2 standard.

(2) It is left as an optional tool in the standard.

END