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

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Subject: Picture Format for High Quality Interactive Video Services

Source: Bellcore

Purpose: Information

1. Introduction

To facilitate inter-region connections, and for ease of multi-point and bridging operations, a SCIF picture format with 528X704 spatial resolution and 59.94 non-interlaced frame rate was suggested in Doc. AVC-60. Henceforth this format will be referred to as 528 format. The 528X704 spatial resolution provides square pel geometry which is a desirable feature in an integrated multi-media terminal environment. In Doc. AVC-29 a second SCIF picture with 576X720 spatial resolution and 59.94 progressive-scan frame rate was proposed. Henceforth this format will be referred to as 576 format.

In this Document we will present some preliminary results comparing the end-to-end performance of both 528 and 576 formats when a combination of coding and format conversion filters is used.

2. Simulation System

In Figs. 1a and 1b we have illustrated the basic configuration of our simulation system. The input signal is based on the CCIR 601 525/60 format with the following spatial and temporal resolutions: 720 pels X 240 lines X 59.94 fields, interlaced.

To generate the SCIF format picture we took the following two steps:

1. By using filter #1, the input image was converted to a "720 pels X 480 lines X 60 frames, non-interlaced" format.
2. Filter # 2 performed line conversion from 480 lines to either 528 or 576 lines.

Further, to study the impact of format conversion filters on the coding efficiency we carried out the following simulations:

1. The input signal at point B (e.g., SCIF format) was coded according to a modified version of H.261 operating in open loop VBR mode. The quantizer step size for each format was adjusted so as to provide approximately the same SNR at the output of filter #3. The motion compensated prediction model was obtained from the previous frame only (similar to SCIF_1 in Doc. AVC-80). The tracking range used was +7/-7 in each direction for a 16X16 luminance macroblock with pel accuracy.

2. By using filter #4, input images with either 528 or 576 lines were converted to 480 lines.
3. Filter # 3 was used to generate a picture with CCIR 601 525/60 format.

3. Simulation Results

Two sets of results are presented in this section.

1. Degradation due to format conversion (i.e., use of pre/post-processing filters) in the absence of coding noise.

SNR (db)		
Field	528-line	576-line
Odd	41.2	41.3
Even	41.4	41.6

2. We coded 20 non-interlaced frames of "Flower Garden" test sequence with both SCIF 528 and 576 formats. These frames were obtained by applying filters #1 and #2 to the first 10 luminance frames of the CCIR input. The difference between the average number of bits/frame used in each format was calculated as a measure of coding efficiency. In the following Table we have summarized our results. Note that the average SNR for 528 format is slightly lower than that for 576 format (less than .28 in all cases).

	528	576	528	576	528	576
Avg. SNR (Odd Org.)	33.61	33.89	35.84	36.11	37.43	37.71
Avg. SNR (Even Org.)	33.70	33.87	35.93	36.28	37.57	37.91
Coding Eff.	%5.56		%5.26		%5.91	

4. Conclusion

The results in Section 3 indicate that in terms of coding efficiency the SCIF 528 format is on average %5.5 more efficient than SCIF 576 format. These results are based on the Flower Garden test sequence using specific set of pre/post-processing filters and coding method described above. We feel further studies are needed in order to reach to a final conclusion on the issue of coded picture format. These include the effect of temporal resolution conversion, filter complexity and their impact on coding efficiency.

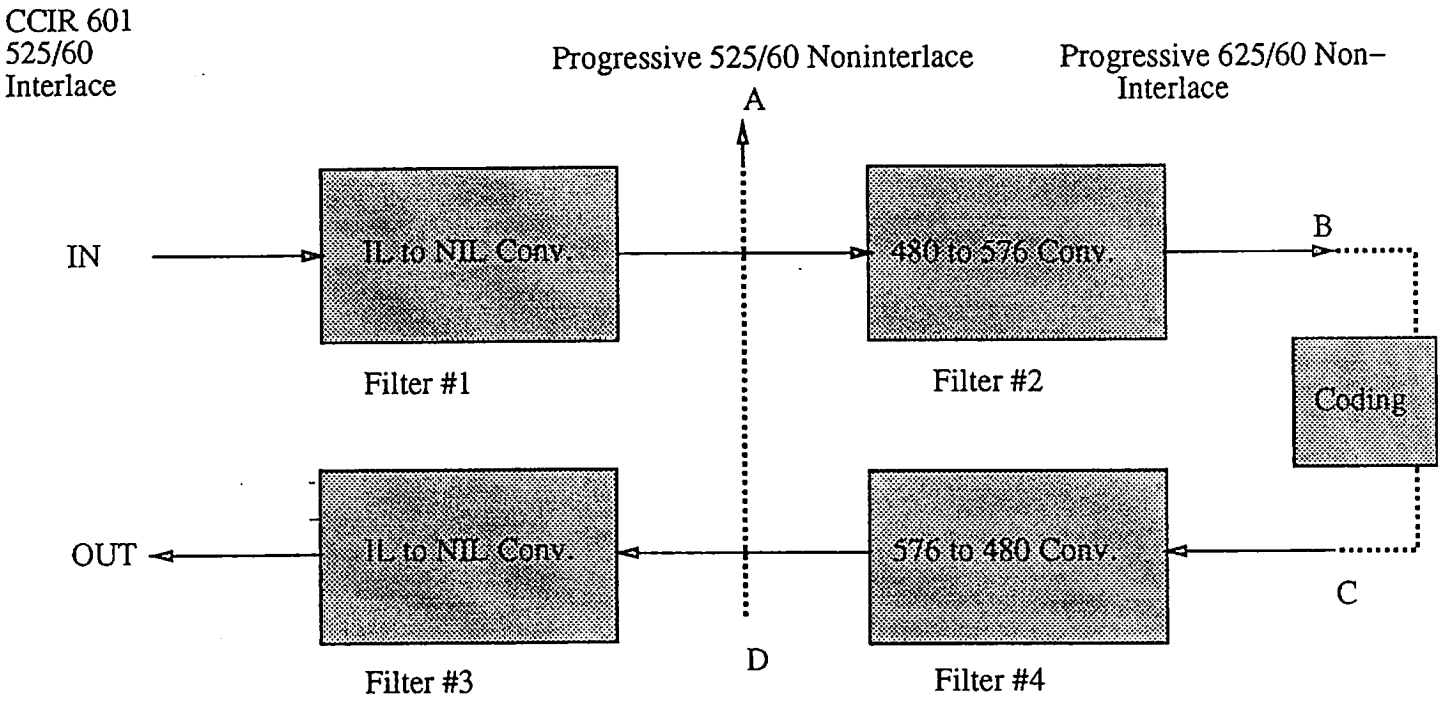

Figure 1a: Configuration of the Simulation System
for SCIF 576 mode

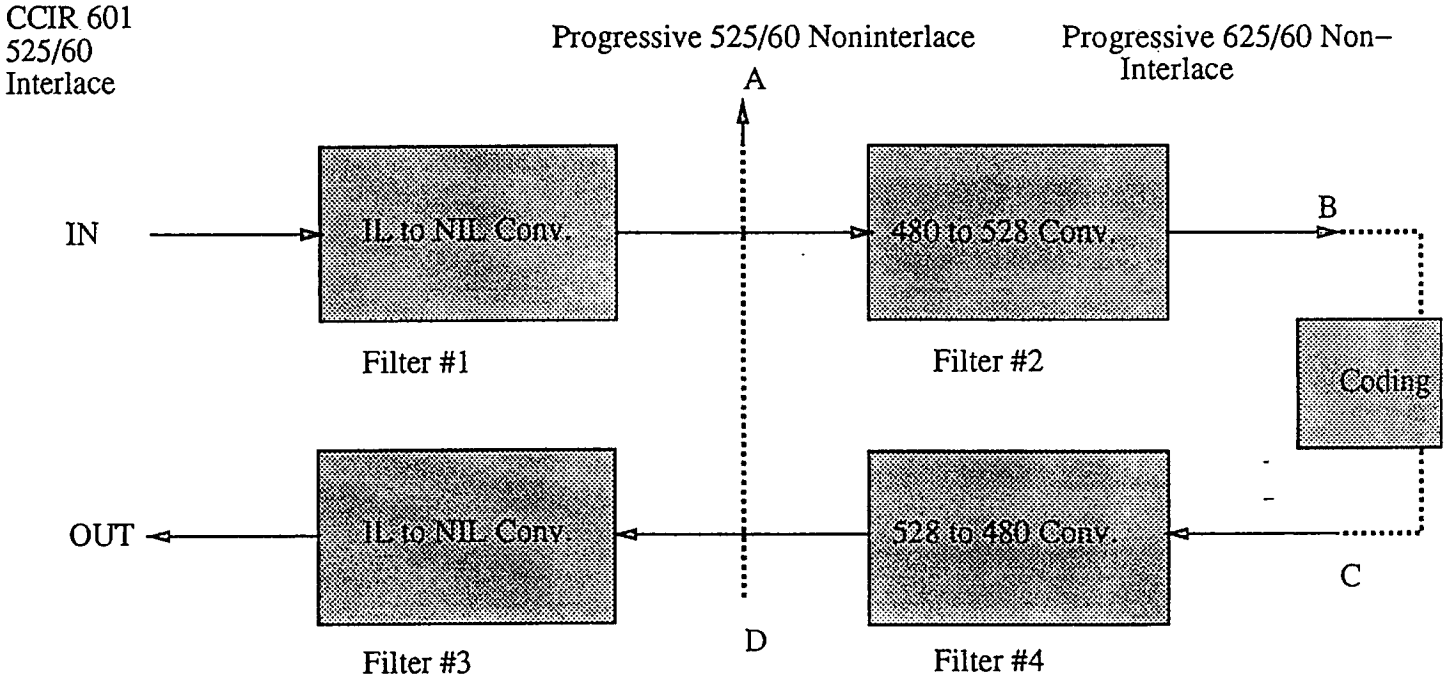

Figure 1b: Cofiguration of the Simulation System

For SCIF 528 Mode