CCITT SGXV
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Specialists Group on Coding for Visual Telephony

Source : NTT,KDD,NEC,&FUJITSU

Title : Basic Parameters of 384kbit/s CODEC

1.Introduction

In this contribution,basic parameters of 384kbit/s codec are reviewed, aiming to establish a single worldwide standard. Based on the agreement of the Holmdel meeting, which classified several proposals into Single mode and Dual mode approaches, study was conducted with special concern in field rate. Some results and the possible basic parameters for moving pictures will be described in this contribution.

2.Basis for consideration

The study was done based on the Holmel meeting agreement which states that the basic parameters should be dermined considering the following principles;

-to establish a single worldwide standard

-equal burden on both regions with different television stsndards for interregional connections

-picture quality and hardware size for inter and intra-regional connection

-coding efficiency

The interface point of video signal should be the "B" point of Fig.1 in Document#32R ; the report of the Holmdel meeting, and in this contribution the number of active luminance pels /line is assumed to 360 as agreed in the Holmdel meeting.

Following items are studied in this contribution.

-number of active lines /field

-field rate

-interlace

-allocation of television standard conversion

3.Study results

Table-1 shows a comparison of the possible three cases , in terms of the items agreed as principles in the Holmdel meeting. The Dual mode approach parameters are assumed as shown in Table-2 in a codec configuration of Fig-1 and Table-3, while the parameters of the the two Single mode approach cases are cross combination of the two number of active lines and two frame rates in the existing television standards without interlace. Computer simulated pictures for intra-regional connection through intermediate formats will be demonstrated.

From this comparison, Dual mode approach is preferred. The main reason to deny the 240/25 case is that its field rate conversion deteriorates the reproduced picture quality to the extent almost unacceptable in the 525 /60 region.

The Dual mode approach has the following advantages.

(1) Single hardware for intra-and interregional connections
-recieving side must have parameter switching-circuit for each mode, but the increase of hardware size is negligible .

(2) Degradation of picture quality or coding efficiency is avoided.
-because of non-existence of television standard conversion before source coding part, source coder is not affected by the conversion distortion.

(3) Degradation of picture quality in intra-regional connection is avoided
-no television standard conversion

(4) In the case of 384kbit /s xn (n ≧2) , the improvement is not limitted by television standard conversion.

(5) Flexibility in television standard conversion
-because the conversion is allocated at the end of video processing part , the hardware implimentation has wide flexibility.

(6) Equal burden on different television standards for connection will be realized.

3.Summary

In this contribution, a comparison of the three possible basic parameters has been presented and preference has been given to Dual mode approach for a single worldwide standard codec.

The picture quality and the codec cost (hardware configuration) are the most important factor , and the Dual mode approach will meet these requirements.

Table-1 Comparison of Single and Dual approaches

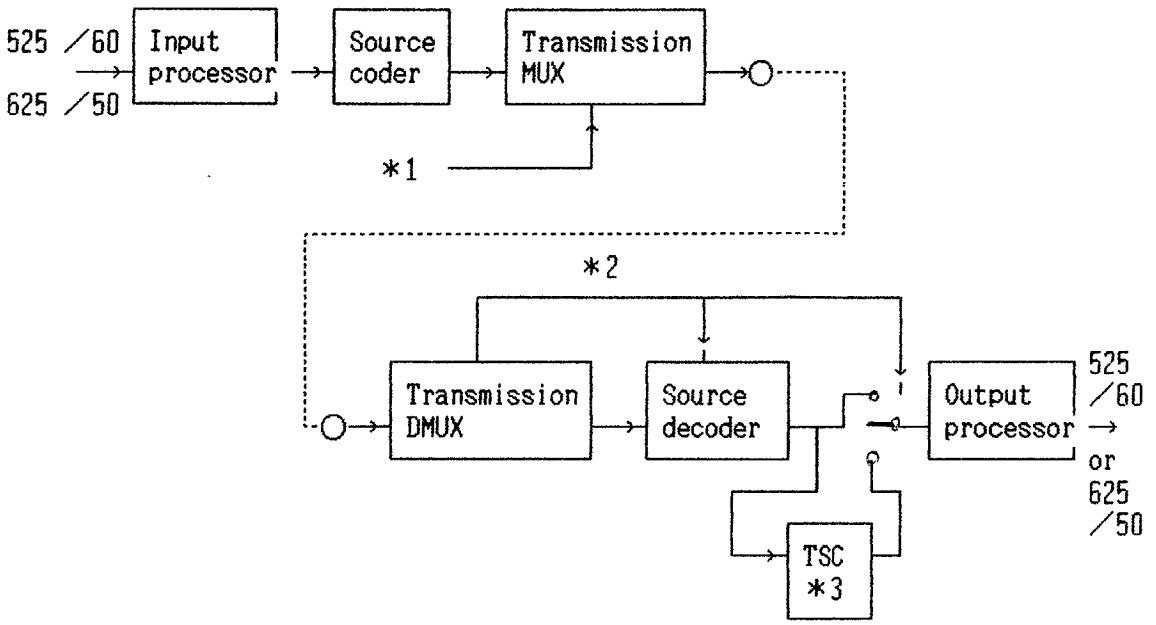
Item		Single approach 240 /25	Single approach 288 /30	Dual approach
compatibility of inter-regional connection		○	○	○
picture quality	intra-regional	△	△~○ *1	○
	inter-regional	△	△	△~○ *1
picture quality improvement *3	intra-regional	△	△~○ *1	○
	inter-regional	△	△	△~○ *1
hardware size		△	△	○
burden of interregional connection		△	△~○ *2	○

*1 varies with abilities of conversion
*2 some differences are observed in picture quality with each television standard
*3 384kb /s x n (n ≧2)

△ : distortion observable or large size
○ : good quality or small size

Table-2 Basic parameters in Dual approach

Input /Output format	Ly line/field	F field /sec	Interlace
525 /60	240	59.94	2 : 1
625 /50	288	50	2 : 1



*1 parameter information is set at transmitting side
*2 recieved parameter information sets the source decoder and selects decoder output or TSC output
*3 TSC : Television standard conversion

Fig-1 Configuration of Dual approach codec

Table-3 Types of Dual approach codec

Type	Region (input,output)	Television Standard Conversion
1	525 /60	625 /50→525 /60
2	625 /50	525 /60→625 /50

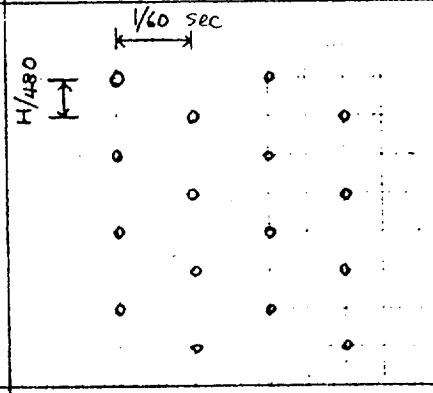
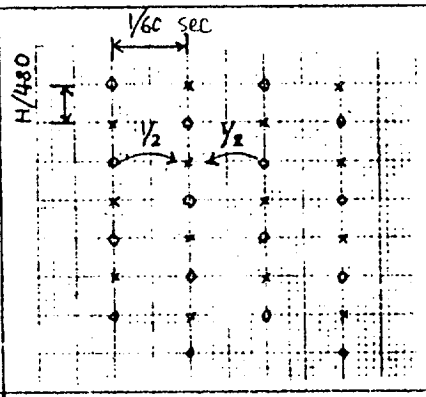
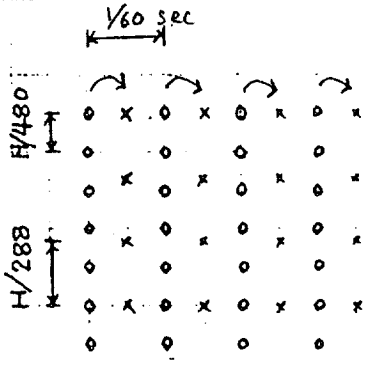
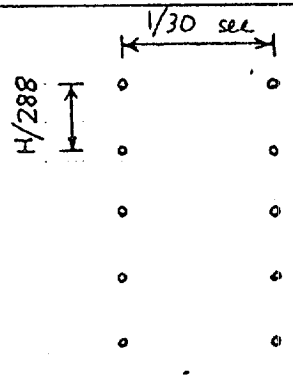
Annex to Document #41

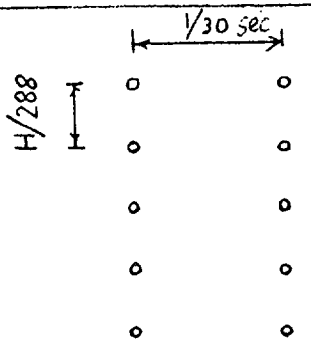
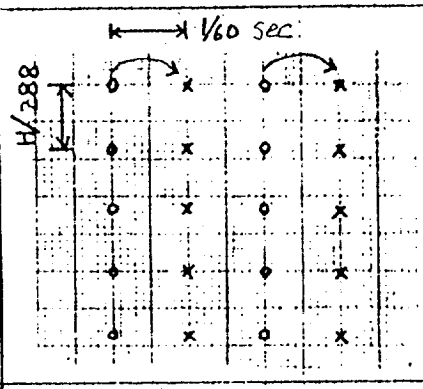
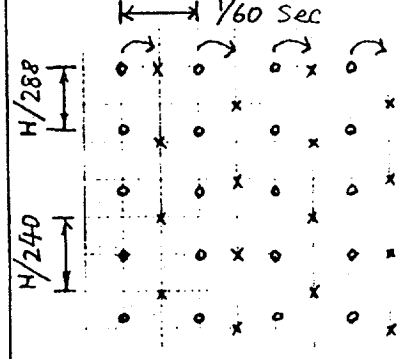
PROCESSED PICTURES WITH TELEVISION STANDARDS CONVERSION

No.	Sequence	Processing	Time
1	1000	Original (M=480/60/2:1)	00'00" - 00'27"
2	1000	M to 288/30/1:1 to M	00'27" - 01'37"
3	1000	M to 240/25/1:1 to M	01'37" - 02'44"
4	E	Original and M to 288/30/1:1 to M	02'44" - 04'46"
5	X(Split)	576/50/2:1 to 288/30/1:1 to 576/50/2:1 (displayed in M)	04'46" - 05'42"
6	X(Split)	288/30/1:1 intermediate format (displayed in M)	05'42" - 06'39"

Note : Principle of line number conversion using 288/30/1:1 intermediate format is shown in Figure A1. Principle of field rate conversion using 240/25/1:1 intermediate format is shown in Figure A2.

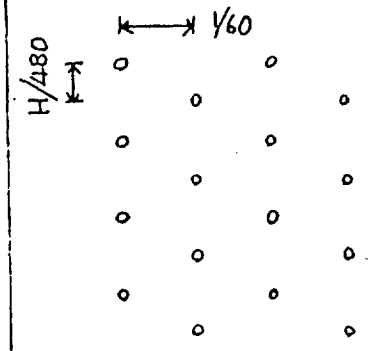
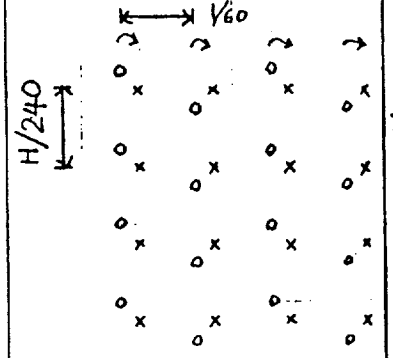
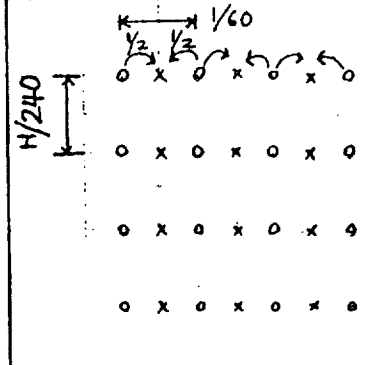
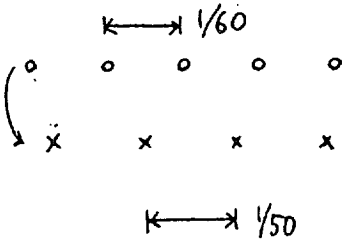
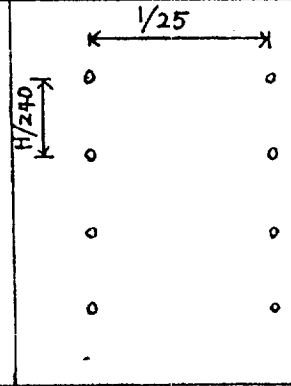
Fig. A1 LINE NUMBER CONVERSION

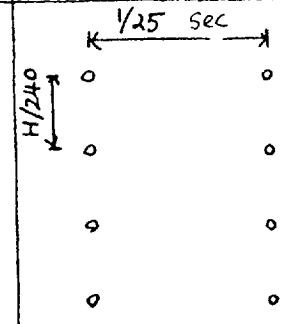
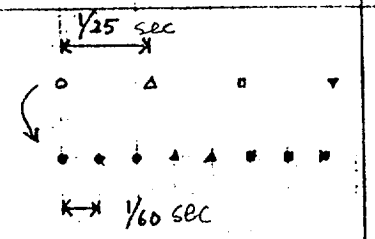
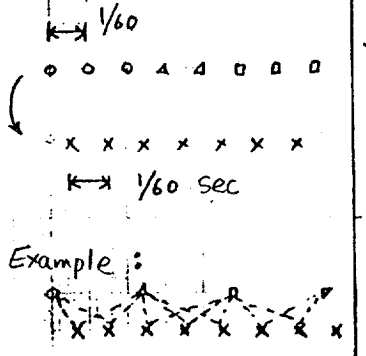
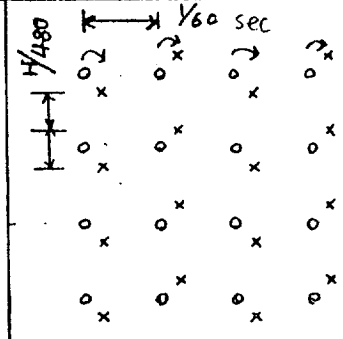
	Input ① 480 lines 2:1 59.94 Hz	② 480 lines 1:1 59.94 Hz	③ 288 lines 1:1 59.94 Hz	④ 288 lines 1:1 29.97 Hz
CODER				
NOTE			interpolated using 5 lines (coefficient sets : 3)	sub-field

	Input ④ 288 lines 1:1 29.97 Hz	⑤ 288 lines 1:1 59.94 Hz	Output ⑥ 480 lines 2:1 59.94 Hz
DECODER			
NOTE		field repetition	interpolated using 5 lines (coefficient sets : 5)

o input for each stage

× interpolated output

	Input ① 480 lines 2:1 59.94 Hz	② 240 lines 1:1 59.94 Hz	③ same as ②	④ same as ②	⑤ 240 1:1 25 Hz
CODER					
NOTE		±1/4 line shift. interpolated using 5 lines (coefficient sets : 2)		interpolated using 2 fields (coefficient sets : 32)	sub-field (5994 → 2500)

	Input ⑤ 240 lines 1:1 25 Hz	⑥ 240 lines 1:1 59.94 Hz	⑦ same as ⑥	Output ⑧ 480 lines 2:1 59.94 Hz
DECODER				
NOTE		field repeat (2 or 3 times)	interpolated using 2 fields (coefficients : 32)	±1/4 line shift interpolated using 5 lines (coefficient sets : 2)

○, △, □, ▽ : input for each stage

×, ●, ▲, ■ : interpolated output

Fig. A2 FIELD RATE CONVERSION