CCITT SGXV
Working Party XV/1
Specialists Group on Coding for Visual Telephony

Document #583R
November 10, 1989

SOURCE: CHAIRMAN OF THE SPECIALISTS GROUP
TITLE : REPORT OF THE SEVENTEENTH MEETING IN TOKYO (November 7 - 10, 1989)

CONTENTS

1. GENERAL

The Specialists Group met in Tokyo, Japan, from November 7 to 10 at the kind invitation of Ministry of Posts and Telecommunications. Welcoming address was delivered by Mr. K. Aoki on behalf of the hosting organization.

The list of participants appears at the end of this report.

At the closing session, Chairman thanked the hosting organization and secretariat organizations (The ITU Association of Japan, TOSHIBA, HITACHI and MITSUBISHI ELECTRIC) for the meeting facilities provided and the excellent operation of the meeting.

2. DOCUMENTS FOR THE MEETING (TD2)

For this meeting, 43 normal documents and 13 temporary documents have been available. Annex 1 shows the outline of each document.

3. TAPE DEMONSTRATIONS (TD3)

A number of tape demonstrations as listed in Annex 2 were presented during the meeting.

4. FIELD TRIAL (#558, #564, #573)

Overview of field trials in Japan, USA and FRG were presented by Mr. Takishima, Mr. Hein and Mr. May respectively by using their documents. Mr. Carr orally presented his field trial results between UK and Japan and between UK and USA.

It was reported that general compatibility had been verified among independently designed Flexible Hardware for CIF/QCIF at various values of p, thus we could draft the final Recommendation based on the Flexible Hardware specification. Video tape demonstrations also provided convincing evidence. Furthermore, on November 8 the meeting observed back-to-back connections among Flexible Hardware in Japan as well as an international connection between Japan and UK at KDD Kamifukuoka Laboratories.

Only one problem identified through the field trial was the IDCT mismatch (see §6.3 of this report).

5. REPORT OF THE EDITORIAL GROUP MEETING (#571, #572)

Mr. Morrison presented an outline of the Editorial Group meeting held in Ipswich during October 24-25, highlighting the items for the consideration of this meeting.

Its outcome was taken up in detail in the following discussions on the technical specification.

6. SOURCE CODING

6.1 Source format

6.1.1 Picture format and minimum coded picture interval (#541, #565, 5.2.1/#571)

Mr. Carr and Mr. Hein proposed in their documents that the selection of QCIF/CIF and minimum coded picture interval should be independent of the value of p, and that the values 0, 1, 2 and 3 picture periods between coded pictures are sufficient to define the minimum coded picture interval.

The meeting supported this view and agreed to include the wording proposed in Doc. #541 for the final Recommendation.

Mr. Carr clarified the background of proposing "by an external means" for this and other purposes that H.261 codecs are not only used in visual telephony where H.221 muldex is applied but also in such applications as surveillance where only video coding may be concerned.

6.1.2 Number of transmitted blocks per picture as decoder capability (#541, #562, #565, §5.2.2/#571)

Views of Europe, USA and Japan were presented by Mr. Carr, Mr. Hein and Mr. Takizawa, respectively. According to the indicated opinions, the meeting decided not to include this feature in the final Recommendation.

6.2 Loop filter

6.2.1 Motion compensated but not filtered macroblock (#553, §5.3.1/#571)

Mr. Hayakawa reported that their simulation results support the new macroblocks introduced at the Stuttgart meeting since it gives improvements in higher bit rates for some sequences but not affects the performance at lower bit rates.

The meeting agreed to maintain the current Flexible Hardware specification on this aspect in the final Recommendation.

6.2.2 16x16 filtering for luminance blocks (#563, §5.3.2/#571)

Mr. Lee proposed to include a feature of the 16x16 filtering for luminance blocks in the final Recommendation on an optional basis. Since there was no support for this proposal, the meeting decided not to adopt this proposal.

6.3 IDCT

6.3.1 Mismatch problem found (#559, #569)

Mr. Okubo and Mr. Kato presented the IDCT mismatch problem found in the field trials using Flexible Hardware, particularly with a step size fixed at 8, and the mechanism to cause such mismatch.

The meeting recognized that this type of mismatch caused by a single component of (0,0), (4,0), (0,4) or (4,4) or by combinations of them can not be avoided completely as far as we take the approach to allow freedom in the IDCT design.

6.3.2 Solution (#570, #582)

Two solutions were provided by Mr. Brusewitz and Mr. Hein in their documents. The first solution in Doc. #570 is to modify the even numbered quantizer reconstruction levels by one, which are liable to cause the mismatch. The second solution in Doc. #582 is to specify the pel values precisely for the IDCT input consisting of only a (0,0) component.

The following comments were expressed against the second method;

- Since other (4,0), (0,4) and (4,4) components should also be considered, the specification becomes complicated.
- Eventually we must precisely define whole of the internal structure in the IDCT.
- There are chips in the market.

After discussion, the meeting agreed to maintain the previous policy for the IDCT specification and solve this problem by carefully designing quantizers.

6.3.3 Information to ISO and IEEE

Chairman will submit a document of notice on the IDCT mismatch problem and our solution for H.261 to ISO and IEEE. The draft will be circulated after the meeting.

6.4 Quantization

6.4.1 Quantizer step sizes corresponding to QUANT and reconstruction levels (#547, #566; #546, #570; TD4)

Mr. May proposed to include step size 2 but exclude step size 64 in Doc. #547 to get better performance for still pictures and at higher bit rates, while Mr. Hein proposed two alternatives to get easier coding control of QCIF pictures.

Mr. May proposed in Doc. #546 that the Recommendation should specify only reconstruction levels of quantizer but not decision levels, which was immediately supported by the meeting. Mr. Brusewitz proposed a solution for the mismatch problem in Doc. #570, where only odd numbered reconstruction levels are used and a complete table to show the relation between step size and reconstruction levels are provided.

After some discussion, Mr. Brusewitz undertook to coordinate a small group discussion on the quantizer selection in the light of performance improvements and IDCT mismatch problem solution. The outcome is as follows:

The small group met to review available documents on quantization, and to come to a final conclusion. The following proposals were considered:

A g = 2*QUANT (#546)

B g = QUANT+1 QCIF
g = 2*(QUANT+1) CIF (#566)

C g ="Exponential mapping" (#566)

D Reconstruction level = "odd" (#570)

Proposal B was withdrawn due to earlier criticism for multipoint operation. It was concluded that proposal A is simple, tested and proposal D works. For proposal C it was claimed that it allows improved buffer control, which however was debated. The meeting finally agreed to adopt proposals A and D.

Reconstruction levels are achieved by the following formulae:

rec = QUANT(2*LEVEL+1) ; LEVEL>0
rec = QUANT(2*LEVEL-1) ; LEVEL<0
} QUANT = "odd"

rec = QUANT(2*LEVEL+1)-1; LEVEL>0
rec = QUANT(2*LEVEL-1)+1; LEVEL<0
} QUANT = "even"

rec = 0; LEVEL=0

The meeting approved this report and also agreed to include Table 1/#570 in the final Recommendation with errors corrected and with the formulae to give reconstruction levels as function of QUANT and LEVEL as above.

It was reported that the field trials in Japan and between UK and Japan had tested the above new range of step sizes as well as the modified quantizer reconstruction levels and that these modifications had been verified to work without problems.

6.4.2 Clipping at the input of IDCT

Table 1/#570 including such large values as 7905 which normally do not occur stimulated the meeting to discuss on the necessity of clipping function in the DCT frequency domain.

Considering the possible incompatibility due to different processing around

the upper limit of quantized IDCT input values, the meeting decided to specify a clipping function at the IDCT input with a wording of "The reconstructed levels are clipped to the range of -2048 to +2047" attached to the formulae in TD4.

Accordingly those values outside that clipping range in Table 1/#570 are modified to -2048 or +2047.

6.4.3 Adaptive quantization (#548, #552, §5.5.2/#571)

Mr. Yukitake and Mr. May presented their views on adaptive quantization that the current method operating in the Flexible Hardware should be maintained in the final Recommendation; same quantizer is applied to all coefficients except INTRA dc component regardless of luminance/chrominance.

6.4.4 Warning against quantizer overloads (§5.5.4/#571)

The meeting approved the Note in §3.2.5/#572 which had been included according to the agreement in Stuttgart (see §6.2.2/#540R).

7. VIDEO MULTIPLEX CODING

7.1 Data structure

7.1.1 Leftmost bit first (#546, §5.6.1/#571)

A clarification proposal in Doc. #546 presented by Mr. May was accepted for inclusion in the final Recommendation.

7.1.2 Note for spare bits (#550, §5.6.2/#571)

A note to clarify the use of spare bits was adopted in the final Recommendation. This is to avoid confusion caused if these bits were used for national or proprietary purpose.

7.1.3 Syntax diagram (§5.20/#571; TD6)

Mr. Lemay suggested a modification of the diagram for MB LAYER, because the one in Figure 4/#572 is over simplified. The meeting accepted this amendment.

Mr. May pointed out that the current draft uses different indications for video multiplex layers; P/G/M, 1/2, A/B. It was decided to use indexes P/G/M for picture/GOB/macroblock layer elements.

7.2 Picture and GOB headers

7.2.1 Structure of Picture and GOB headers
(#550, #554, §5.7.1/#571)

Mr. Carr and Mr. Kato proposed two structures of Picture and GOB headers which streamlined the current ones. Difference between these two proposals are in whether the length of PSPARE/GSPARE bits are variable. Furthermore, "linked list" processing of PSPARE/GSPARE is included in the proposal of Doc. #550. The meeting decided to adopt the proposal in Doc. #550 respecting the future backward capability. This implies that the initial products conforming to H.261 should realize this feature.

7.2.2 Format switching by means of Bit 4/PTYPE
(#551, §5.2.3, 5.7.2/#571)

Mr. Takishima presented Doc. #551 proposing the use of Bit 4/PTYPE for the QCIF/CIF source format switching. The meeting supported this proposal.

Mr. Hatori raised a question on whether maximum picture rate is indicated for each of QCIF and CIF. The meeting supported the idea contained in a H.221 related contribution to WPXV/1 from Japan that individual maximum picture rate capabilities should be indicated from the decoder to the coder.

The meeting also agreed to highlight this point in a progress report to the Working Party XV/1 from the Specialists Group.

7.2.3 Parity information (#549, §5.7.3/#571)

Mr. Morrison presented Doc. #549, proposing to remove "PARITY" from the final Recommendation. The meeting supported this proposal.

7.2.4 Emulation of start codes (#550, §5.7.4/#571)

It was pointed out in Doc. #550 that if the last GSPARE code is '0000 0000' followed by '0' indicating absence of further GSPARE bits, then this nine bit code and some MBA codes will cause start code emulation. The meeting agreed to add a note for warning future specifyers on this point. Since the current note in §4.2.2/#572, however, was felt too restrictive, it is modified to simply make warning.

Mr. Carr pointed out that even if start code emulation occurred at this GSPARE position, the encoder can eliminate false resynchronization because the encoder knows the state, and that for resynchronization, this emulation can be treated identically as the one caused by channel errors.

7.3 VLC

7.3.1 VLC for "motion compensated but not filtered"
macroblock (#553, §5.8/#571)

Mr. Hayakawa reported that VLC modifications for TYPE3 do not improve coding performance, thus the current code set is supported. The meeting shared the view.

7.3.2 Note for implementation without motion compensation
(§5.9/#571)

The meeting approved Note 2 in Table 5/#572.

7.3.3 Note for "DCT coefficient transmission order"
(§5.21/#571)

Explanatory notes were added to Figure 12/#572 for clarification.

7.4 Multipoint considerations

7.4.1 Freeze Picture Request (#543, §5.10/#571)

Mr. Carr presented Doc. #543, proposing 6 seconds as the minimum timeout

period of release from picture freeze caused by Freeze Picture Request. The meeting accepted this proposal.

The transmission method for this control signal is via "external means" listing H.221 as an example.

The meeting confirmed that the function of this command is for freezing display but continuing decoding process.

7.4.2 Fast Update Request (§5.11/#571)

The same result as above is applied.

7.4.3 Picture Freeze Release

It was discussed whether this control signal indicates the starting time of new display or the picture coded with INTRA following Fast Update Request. The meeting had a common view that this signalling should not control what picture is displayed in the receiving terminal because it is left to each design, thus Picture Freeze Release signal is included in the picture in response to the Fast Update Request.

8. TRANSMISSION CODING

8.1 Bit rate, clock for video (§5.12/#571, #561)

Mr. Kato presented Doc. #561, proposing the network environment (synchronous/asynchronous) be via out-channel signalling. For our H.261 purpose, the meeting confirmed that the H.261 transmission clock is provided externally.

8.2 Video data buffering (#542, #555, #580, §5.13/#571; TD7, TD8, TD12, TD13)

Mr. Morrison, Mr. Murakami and Mr. Tabatabai presented their papers discussing on the Hypothetical Reference Decoder. Consensus was made on using this HRD to restrict the picture data generation at the coder to guarantee the decoder operation.

The meeting discussed on the definition of HRD and the value of the buffer size B. A particular question was whether B should be dependent on the maximum picture rate capability of decoder or not. The following opinions were expressed;

- If the HRD buffer size B is dependent on the maximum picture rate, then "30 Hz coder operating at 10 Hz against 30 Hz decoder" performs worse than "10 Hz coder operating against 10 Hz decoder".

- It was also pointed out that on the transmission line only operating parameters are relevant, thus the buffer size B should be decoder capability independent.

- For easier coding control implementation, capability dependent definition is convenient.

- When QCIF/CIF is dynamically changed, change of the corresponding HRD buffer size may complicate the design.

Mr. Haskell coordinated concerned members to reach an agreement as follows:

B = 4R/29.97 where R is the maximum video bit rate to be used in the connection.

For remaining definition of Hypothetical Reference Decoder, clarification was made and the final results are in TD12 where varying nature of video bit rate and maximum picture rate capability independence were taken into account.

The meeting agreed to include this modified HRD definition as Annex 2/H.261 in the final Recommendation.

8.3 Delay aspects (§5.1, 5.14/#571; #574, #576; TD4, TD9)

Mr. Carr and Mr. Brusewitz introduced their documents on the codec delay measurement; Mr. Takizawa, Mr. Matsuda and Mr. Hibi orally introduced their considerations on the same topic.

Mr. Carr undertook to coordinate a small group meeting to discuss on "where and how to stipulate the codec delay" and "why and how to measure coder and decoder delay". After extensive discussion, the following outcome was obtained;

Proposed for inclusion in final H. 261

5.3 Video Coding Delay

This item is included in this recommendation because the video encoder and video decoder delays need to be known to allow audio compensation delays to be fixed when H.261 is used to form part of a conversational service. This will allow lip synchronization to be maintained. ANNEX 3 recommends a method by which the delay figures are established. Other delay measurement methods may be used but they must be designed in a way to produce similar results to the method given in ANNEX 3.

ANNEX 3

The video encoder and video decoder delays will vary depending on implementation. The delay will also depend on the picture format (QCIF, CIF) and data rate in use. This section specifies the method by which the delay figures are established for a particular design. To allow correct audio delay compensation the overall video delay needs to be established from a user perception point of view under typical viewing conditions.

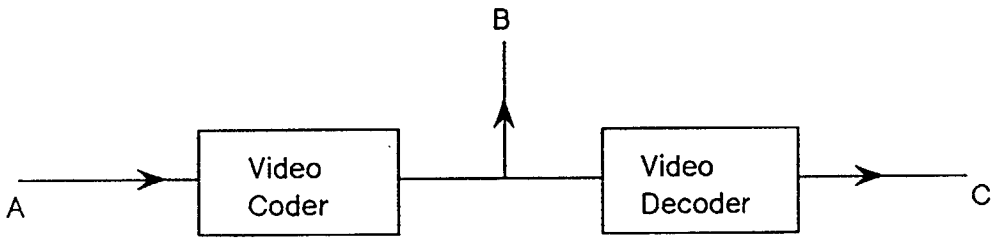

Fig. X

Point A is the video input to the video coder. Point B is the channel output from the video terminal (i.e. including any FEC, channel framing etc.).

Point C is the video output from the decoder.

A video sequence lasting more than 100 seconds is connected to the video coder input (point A) in Figure X above. The video sequence should have the following characteristics.

- It should contain a typical moving scene consistent with the intended purpose of the video codec.

- It should produce a minimum coded picture rate of 7.5Hz at the bit rate in use.

- It should contain a visible identification mark at intervals throughout the length of the sequence. The visible identification should change every 97 video input frames and be located within the picture area represented by the first GOB in the picture. For example the first block in the picture could change from black to white at intervals of 97 video frame periods. The identification mark should be chosen so that it can be detected at point B and does not significantly contribute to the overall coding performance.

The codec and video sequence should be arranged so that the bit stream contains less than 10% stuffing (MBA stuffing + error correction fill bits).

The encoder delay is obtained by measuring the time from when the visible identification changes at point A to the time that the change is detected at point B. Similarly, the decoder delay is obtained by taking measurements at points B and C.

Several measurements should be made during the sequence length and the average period obtained. Several test should be made to ensure that a consistent average figure can be obtained for both encoder and decoder delay times.

Average results should be obtained for each combination of picture format and bit rate within the capability of the particular codec design.

Note: Due to pre and post filtering it may be necessary to take a mid-point for establishing the transition of the identification mark at points B and C.

The meeting approved to include this outcome in the final Recommendation.

Members are requested to measure the delay of their own coder and decoder according to the above method so that the data will be made available at the Working Party XV/1 meeting to be held from Nov. 27. The purpose is to reflect the characteristics of existing hardware when stipulating the maximum allowable delay values.

8.4 FEC

8.4.1 System description

Mr. Carr undertook to draft a paragraph which describes an overview of error correction, filler bits insertion.

8.4.2 FEC performance (#560)

Mr. Kato presented behavior of Flexible Hardware against random errors at p=2, 6, 24 for the cases of with and without error correction, reporting that

BER of lower than 3*10E-5 gives no noticeably errored pictures if FEC is activated.

8.4.3 FEC code (#567, §5.16/#571, #557, #544)

Mr. Hein proposed in Doc. #567 that FEC be an option in the coder for low cost implementation of low-end equipment. This proposal could not obtain consensus because;

- transmission circuits are not always near error free,
- syndrome generation at the coder is simple,
- FEC framing is also used for filler bits insertion.

Mr. Murakami provided information in Doc. #557 on a type of parallel FEC decoder which corrects both of random and burst errors.

Mr. Carr proposed in Doc. #544 to give reference on the relation between a 493 bits input and a 18 bit parity to avoid ambiguity in interpretation of the polarity.

8.4.4 FEC framing (#545, #556, #568; §5.17, 5.18/#571; TD13)

Mr. Carr, Mr. Matsuda and Mr. Tabatabai presented their documents on FEC framing. For the framing pattern, it was agreed to fix the eighth bit at "1".

Protection for frame synchronization includes two aspects; one is the number of consecutive correct detection of 8 bit synchronization patters before declaring establishment of synchronization while the other is the number of consecutive arrowhead patters before declaring loss of synchronization. For the former characteristics, the meeting decided to use the number 3. Necessity of the second characteristics was discussed, but the conclusion was to leave it to each design.

For the re-lock time specification, there were two proposals; 0.5 sec equivalent number of bits (23200 bits) at 46.4 kbit/s video bit rate from Europe and 1.0 second equivalent number of bits (46400 bits) at 46.4 kbit/s for the FEC re-lock. There was the third proposal of from USA, 34000 bits taking into account cascaded operation of detection of synchronization loss and establishment of synchronization. The meeting adopted the third proposal for the final Recommendation, confirming that the re-lock time is the time from a change of synchronization pattern phase to establishment of synchronization as worded in §5.4.4/#572.

8.5 Encryption, Bit Sequence Independence (5.19/#571)

The sections on these items were removed from H.261 because they should be defined in other system Recommendations such as H.221.

9. DRAFT REVISION OF RECOMMENDATION H.261 (#572; TD10, TD12,TD13)

The meeting reviewed the draft produced at the editorial group meeting section by section. Study results obtained at this Tokyo meeting were incorporated in the draft. Editorial elaboration was also achieved.

Mr. Morrison undertook to finalize the text, whose outcome is found in a separate document Doc. #584.

10. INTELLECTUAL PROPERTY

10.1 Informed patents (#577)

Chairman presented an updated list of known patents.

10.2 Statements on disclosure policy (#578)

Chairman reported on the statements received from 2 organizations.

10.3 Statements on licensing policy (#579)

Chairman reported on the statements received from 15 organizations. This action of collecting statements will be continued until the time of WPXV/1 meeting to be held from November 27. Organizations which have not yet submitted the statement are requested to do so.

11. SYSTEM ASPECTS (#581)

Mr. Carr provided information on the standardization study of privacy system for audiovisual communications, which has been carried out in Europe.

12. FUTURE WORK

12.1 Actions toward WPXV/1

12.1.1 Progress report

The Specialists Group will make a progress report covering Stuttgart and Tokyo meetings at the coming WPXV/1 meeting in Geneva. This report will also include a summary of;

- latest field trial results,
- delay measurement results,

thus members are requested to advise Chairman of their experimental results by November 22.

The report will highlight such items for the Working Party consideration as;

- delay aspects, maximum delay and its partition between coder and decoder
- those parts removed from H.261
- video codec delay compensation in the audio path
- QCIF/CIF and corresponding maximum picture rates as video capability
- etc.

Chairman will distribute a draft progress later for the members review.

12.1.2 Proposal of applying "Resolution No. 2" to H.261 revision

The Specialists Group will propose application of Resolution No. 2 (accelerated procedure) to revise Recommendation H.261 according to the text in Doc. #584.

12.2 Method of work in case of need

The Specialists Group will work through correspondence in principle, if there happens any problem in the future, till the Recommendation becomes effective.

12.3 ATM coding (#575)

Mr. Zedler introduced a contribution to the coming WPXV/1 meeting which supports setting up a new experts group on ATM coding.

END

ANNEXES

Annex 1 Documents for the meeting
Annex 2 List of tape demonstrations

LIST OF PARTICIPANTS
(Tokyo; November 7 - 10, 1989)

Chairman	S. Okubo	- NTT, Japan

Core Members

F. R. of Germany	G. Zedler	- DBP-TELECM
Canada	F. Lemay	- BNR
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	A. Tabatabai	- BELLCORE
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	J. Guichard	- CNET
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	T. Murakami	- Mitsubishi Electric
	K. Ohzeki	- Toshiba
	F. Sugiyama	- Toshiba
	Y. Takishima	- KDD
	M. Takizawa	- Hitachi
	T. Yukitake	- Matsushita Communication Ind.
United Kingdom	M.D. Carr	- BTRL

DOCUMENTS FOR THE TOKYO MEETING

Normal Documents

#540R REPORT OF THE SIXTEENTH MEETING IN STUTTGART (CHAIRMAN)

Points agreed upon and/or left for further study in the previous meeting are recorded to provide backgrounds for discussion in this meeting.

#541 PROPOSAL CONCERNING RESTRICTING THE ENCODED PICTURE CONTENT BY LIMITING THE MAXIMUM PICTURE RATE
(UK, FRANCE, FRG, NETHERLANDS, NORWAY, SWEDEN, ITALY)

A proposal is made to maintain the current specification on restricting the encoded picture content since it is workable for all codecs, unambiguous, and easily validated. The rationale is that attempts to define a restriction on processing units are ultimately design specific, difficult to quantify and hence validate, and require extra complexity in the specification and in encoder designs. Improves wordings for the final Recommendation are also proposed.

#542 H.261 BUFFER SPECIFICATION
(UK, FRANCE, FRG, NETHERLANDS, NORWAY, SWEDEN, ITALY)

The concept of buffer specification using Hypothetical reference Decoder which was developed in Stuttgart is supported for inclusion in H.261, showing two examples of coder construction with which conformance is guaranteed by design rather than by some monitoring function. For the size of HRD buffer, 4R/29.97 (R=video bit rate) is proposed.

#543 FREEZE PICTURE REQUEST - TIMEOUT PERIOD
(UK, FRANCE, FRG, NETHERLANDS, NORWAY, SWEDEN, ITALY)

It is proposed to set the timeout period for "Freeze Picture Release" at a minimum of 6 seconds after considering such factors as multiple hop satellite connection, DSP processing speed and the maximum 256 Kbit intra coded picture which may affect the low bit rate operation of H.261 codecs.

#544 ERROR CORRECTION CONFORMANCE (BTRL)

In order to avoid ambiguity in implementing FEC, the following example of FEC input data and its corresponding error correction parity bits is proposed for inclusion in the final Recommendation:

Input data: 0111111111111...11 (493 bits)
Parity bits: 011011010100011011 (18 bits)

#545 RE-LOCK TIME FOR THE ERROR CORRECTION FRAMING (BTRL)

The following specification concerning the FEC framing is proposed to adapt H.261 codecs to the switching video multipoint operation:

1) Three consecutive error correction Barker sequences should be received before frame lock is said to be achieved.
2) Frame lock should always be re-established within 23200 bits after a change of error correction framing phase, equivalent to 0.5 sec in

case of 46.4 kbit/s video bit rate.

3) The eighth framing bit currently being "don't care" should be fixed at 'one'.

#546 TWO REMARKS TO THE TEXT OF THE FLEXIBLE HARDWARE SPECIFICATION (FRANCE, FRG, ITALY, NETHERLANDS, SWEDEN, UK)

According to the compatibility test results between two independently developed coding and decoding programs, the following two clarifications are proposed for inclusion in the final Recommendation;

1) A note should be added stating that unless specified otherwise the leftmost bit is transmitted first.
2) For quantizer specification, only reconstruction levels into the IDCT should be described.

#547 DEFINITION OF THE QUANTIZER STEPSIZE (FRG, FRANCE, ITALY, NETHERLANDS, SWEDEN, UK)

With the current minimum step size 4, some artifacts like blocking and periodic structures caused by isolated coefficients are visible in gray shaded areas of picture for still pictures or at higher bit rates. The following step size formula is proposed to allow minimum step size of 2;

$g = 2 \times QUANT$ where QUANT is 1 to 31.

#548 ADJUSTMENT OF THE FIGURE FOR THE QUANTIZER ASSIGNMENT (FRG, FRANCE, ITALY, NETHERLANDS, SWEDEN, UK)

It is proposed to simplify the quantizer assignment in the final Recommendation so that the same step size is used for all coefficients of a block except INTRA dc coefficients, since experiences show that this specification delivers good results.

#549 PARITY INFORMATION IN THE PSC (UK, FRANCE, FRG, NETHERLANDS, SWEDEN, ITALY)

It is proposed to exclude PARITY in the final Recommendation because it becomes useless due to IDCT mismatch error, inherent confusion with codec identification and possible misoperation of Freeze Picture Release in multipoint environments as well due to use of FEC and error resilience of the coding algorithm.

#550 PROPOSAL FOR PICTURE AND GOB HEADERS (SWEDEN, UK, FRANCE, FRG, NETHERLANDS, ITALY)

Some spare bits of TYPE1 and whole bits of PARITY and TYPE2 are proposed to be dropped for Picture/GOB header compaction. PSPARE and GSPARE linked lists are also proposed for future backward compatibility.

#551 SWITCHING METHOD FOR PICTURE FORMAT (JAPAN)

There are following two methods for the QCIF/CIF switching;

- First a BAS code for mode switching is transmitted, then Bit 4/TYPE1 follows as control.
- Bit 4/TYPE1 is used for format switching.

After having compared these with respect to noise immunity and system flexibility, the second method is proposed for inclusion in the final Recommendation.

#552 THE CONTENT OF THE QUANTIZER SELECTION TABLE (JAPAN)

As far as obtained simulation results indicate, effectiveness of adaptive quantization has not been found for either of intra/inter, Y/C or sequency dependent quantization. The specification that "the selected quantizer is used for all coefficients except the dc coefficient INTRA coded block" is supported.

#553 LOOP FILTER CONTROL (JAPAN)

Introduction of "motion compensated but not filtered" macroblock types have been found effective at higher bit rates for some sequences but not at lower bit rates according to the simulation results. The current Flexible Hardware specification is supported for the final Recommendation with the second note in Table 1 (Annex 4 to Doc. #540R) removed.

#554 PICTURE AND GOB HEADERS (JAPAN)

Reduction of header bits have been considered to reach a proposal of removing Bit 7-13/TYPE1, PARITY, PEI2 from the picture header and removing TYPE2, GEI, GSPARE from the GOB header.

#555 BUFFER SPECIFICATION (JAPAN)

The tentative solution obtained at the Stuttgart meeting is supported to specify data generation rate at the coder. Wordings for the Recommendation are proposed with the value of HRD buffer size B as R*k/29.97 where R is the video bit rate and k/29.97 is the minimum decodable picture interval. Varying nature of R is discussed to give a safer side solution. Examples of coder and decoder designs to meet the specification are also indicated.

#556 ERROR CORRECTION FRAMING LOCK-UP TIME (JAPAN)

Requirements to specify the lock-up time are discussed with respect to estimated worst case lock-up time in the switching multipoint system, flexibility of hardware design, man-machine interface and system design. Assuming a framing pattern of 8 bits and re-synchronization establishment after three consecutive synchronization detections, one second is proposed for the maximum re-lock time.

#557 ERROR CORRECTION BY PARALLEL DECODER WITH SWITCHING FUNCTION (JAPAN)

C1 code in the current specification and another code C17 are compared in error correcting performance in parallel decoders for up to 9 bits burst (Riger bound). Since the difference is small and C17 may need more complex hardware, it is proposed to maintain the current C1 code in the final Recommendation.

#558 FIELD TRIAL OF FH IN JAPAN (JAPAN)

Information is provided on participating organizations, working modes of their Flexible Hardware and system configurations for back-to-back

connection tests as well as interconnection tests through transmission channels. As a summary of results, compatibility among independently developed Hardware is presented, reporting that the CCITT specification has been verified except the IDCT mismatch problem.

#559 REPORT ON IDCT MISMATCH EXPERIMENTS (JAPAN, BTRL)

The IDCT mismatch has been tested among several Flexible Hardware in Japan and UK with different IDCT implementations, finding out that blocking due to mismatch rapidly appears in some combinations, particularly with the step size fixed at 8/24, cyclic refresh turned off, fixed coding mode at INTER, and motion vectors fixed at zero. In order to verify the possible mechanism stated in Doc. #569, modifications of quantizers to provide odd numbered reconstruction levels have been experimented, resulting in that they generate only granular and hardly noticeable mismatch noise.

#560 px64 FH CHARACTERISTICS AGAINST RANDOM ERRORS (JAPAN)

Decoded pictures have been observed under random error condition in the channel at p=2, 6, 24. It is concluded that error rates below 3×10^{-5} do not degrade the reproduced image if the FEC is activated.

#561 INDICATION OF CLOCK ENVIRONMENT (JAPAN)

The necessity and possible channels for indicating synchronous or asynchronous environments are surveyed, proposing the use of out-channel signalling including manual means, not in-channel signalling.

#562 MAXIMUM FRAME RATE SPECIFICATION ACCORDING WITH THE NUMBER OF SIGNIFICANT BLOCKS IN EACH FRAME (JAPAN)

The previous proposal to include an additional restriction to the coder in terms of "number of significant blocks per picture" is withdrawn since the advantage of this approach is implementation dependent.

#563 LOOP FILTERING ON 16x16 LUMINANCE BLOCKS (KOREA - ETRI)

Since RM8 simulation results show that 16x16 filtering for luminance blocks is significantly effective, it is proposed to include this feature in the Recommendation on an optional basis. If both codecs are found to have this feature through the video capability exchange, then it is turned on, otherwise the 8x8 filtering is used.

#564 USA FLEXIBLE HARDWARE STATUS
(VIDEOTELECOM, BELLCORE, AT&T, PICTURETEL, CLI)

Current status is reported on the video codec portions developed individually by VideoTelecom, PictureTel and CLI and the communication portion developed jointly by AT&T and Bellcore.

#565 SIGNIFICANT BLOCK LIMIT (VIDEOTELECOM, BELLCORE)

The previous proposal is not pursued any further since its advantage is implementation dependent. The current specification for decoder capabilities stipulating the minimum frame interval of 0, 1, 2, and 3 frame periods, QCIF/CIF and maximum value of p is felt adequate.

#566 MODIFICATION OF QUANTIZER STEP SIZE (VIDEOTELECOM, BELLCORE)

Based on some experiments using a Flexible Hardware system, the following two alternative modifications are proposed to improve the QCIF buffer regulation;

1) g = QUANT + 1, giving a range from 2 to 32 in steps of one for QCIF. For CIF, the current quantizer is applied.

2) The following pseudo exponential mapping of the quantizer for both QCIF and CIF;

$$g = \begin{cases} QUANT + 1 & 1 \leqq QUANT \leqq 15 \\ QUANT*2 - 14 & 16 \leqq QUANT \leqq 23 \\ QUANT*3 - 37 & 24 \leqq QUANT \leqq 27 \\ QUANT*4 - 64 & 28 \leqq QUANT \leqq 31 \end{cases}$$

#567 OPTIONAL FEC (VIDEOTELECOM, BELLCORE)

A proposal is made to make FEC an optional feature in the Recommendation, because the 4% redundancy is significant at 64 kbit/s while mean time between error becomes long at this rate. Another motivation is to reduce hardware burden for syndrome generation and the FEC framing.

#568 ERROR-CORRECTION RE-LOCK TIME (BELLCORE, PICTURETEL, VIDEOTELECOM)

Further study is felt required to specify the maximum framing time with hardware complexity and system design taken into account. It is pointed out that a rule for specifying number of framing pattern violations before declaring out-of-frame should also be established.

#569 IDCT MISMATCH FOUND IN FLEXIBLE HARDWARE EXPERIMENTS (CHAIRMAN)

The mechanism is analyzed which causes mismatch errors between two IDCTs even if both of them meet the CCITT specification. Mismatch happens systematically when the IDCT output pel values are expected to be exactly (integer + 1/2) due to difference in arithmetic precision. A solution is requested for the final Recommendation. Requirements for the solution are also listed up.

#570 PARTIAL SOLUTION TO IDCT MISMATCH PROBLEM (SWEDEN)

A solution is presented to cope with the problem raised in Doc. #569, where only odd numbered reconstruction levels are fed into the IDCT. Formulas and a specific table for quantizer reconstruction levels are provided for all values of step sizes.

#571 REPORT OF THE EDITORIAL GROUP MEETING IN IPSWICH (CHAIRMAN)

Participants, reviewed documents, achievements and items which has been identified as needing consideration of the Tokyo meeting are reported. Major outcome is the draft revision of Recommendation H.261 in Doc. #572.

#572 DRAFT REVISION OF RECOMMENDATION H.261 (EDITORIAL GROUP)

A whole text of H.261 reflecting the study results available at the time of the editorial group meeting. Items to be worked out at the Tokyo meeting are indicated.

#573 H.261 COMPATIBILITY CHECK IN GERMANY (DAIMLER BENZ, PKI)

It is reported that no coding or decoding errors were observed when a DB encoder was connected with a PKI decoder. In this field trial, transmission rate was 64 and 48 kbit/s, and no FEC and H.221 framings were used.

#574 H.261 VIDEO CODEC DELAY (BT)

This document discusses on how to measure the encoder and decoder delays without buffer delays by sourcing a series of black pictures for around 5 seconds followed by a series of white pictures. Since the buffer delays are predictable from the specification, it is suggested to delay audio at the encoder/decoder by the above video coder/decoder delay plus half of the buffering delay.

#575 NEW CCITT VIDEO EXPERTS GROUP FOR ATM CODECS (UK, FRG)

It is proposed that a new video coding specialists group be established under the auspices of WP XV/1 to carry out studies on video compression algorithms, relationship between video coding algorithm and network parameters, and compatibility with H.200 audiovisual systems.

#576 IDEAS ON DELAY MEASUREMENT (SWEDEN)

Guidelines are given to establish a method to measure coding and decoding delay. Definition of "overall delay" stressing users point of view and component delays contributing to it are presented, and then appropriate methods to measure individual delays of coder and decoder are discussed, concluding that exact conditions for measurements have to be defined.

#577 LIST OF INFORMED PATENTS - ISSUE 4 (CHAIRMAN)

Patents are listed up which have been informed the Specialists Group as being relevant to the nx384 Flexible Hardware, the draft H.261 or the px64 Flexible Hardware.

#578 PATENT INFORMATION DISCLOSURE POLICIES (CHAIRMAN)

A collection of statements received after the Stuttgart meeting.

#579 PATENT LICENSING POLICIES FOR REC. H.261 (CHAIRMAN)

A collection of statements received after the Stuttgart meeting.

#580 REFERENCE-DECODER BUFFER SPECIFICATION (BELLCORE)

Analysis of the dynamics of buffer operation is given toward providing a specification for buffer size B. Assuming the interframe variance for number of coded bits per frame, probability of buffer overflow is estimated. As a conclusion, B=4R/P is suggested where R is the video bit rate and P is the output decoder frame rate.

#581 VIDEOCONFERENCING CONFIDENTIALITY MECHANISM FOR THE SECOND GENERATION VIDEOCONFERENCING PRIVACY SYSTEM (NORWAY, SWEDEN, UK, FRANCE, FRG, ITALY, NETHERLANDS)

It is informed that several European countries have been collaborating to produce a specification on the subject with an announcement that a draft version is made available to interested parties at this Specialists Group meeting.

#582 IDCT MISMATCH (VIDEOTELECOM, BELLCORE)

It is proposed to specify precisely the output pel values for the case that only dc component is input to IDCT, tightening up the IDCT specification.

Temporary Documents

No. 1 Agenda for the Tokyo meeting (Chairman)
No. 2 Available documents (Chairman)
No. 3 List of tape demonstrations (Chairman)
No. 4 Summary of the discussion (Small group on quantization)
No. 5 Proposed text for the delay part in H.261 (Small group on delay)
No. 6 Syntax diagram for the MB layer (Mr. Lemay)
No. 7 Suggestions to modify Annex 2 to Doc. #572 to cope with varying nature of video bit rate (Chairman)
No. 8 Suggestions to modify Annex 2 to Doc. #572 (Mr. Morrison)
No. 9 TD5 revised
No.10 Draft revision of Recommendation H.261 (Mr. Morrison)
No.11 Draft report of the Tokyo meeting (Chairman)
No.12 Text for Annex 2 to H.261: Hypothetical Reference Decoder (Mr. Carr)
No.13 Error correction: words for final H.261 text (Mr. Carr)

END

Annex 2 to Doc. #583R

LIST OF TAPE DEMONSTRATIONS (November 7, 1989)

	Topics	Source	Doc.
a	Content of the quantizer selection table	Japan	#552
b	IDCT mismatch	Japan	#559, #569
c	Flexible Hardware test between PKI and DB	Daimler Benz	#573
d	Field trials with Japan and USA	BTRL	