

**INTERNATIONAL ORGANISATION FOR STANDARDISATION**  
**ORGANISATION INTERNATIONALE DE NORMALISATION**  
**ISO/IEC JTC1/SC29/WG11**  
**CODING OF MOVING PICTURES AND AUDIO**

ISO/IEC JTC1/SC29/WG11 **N4065**

March 2001, Singapore

**Title: CALL FOR PROPOSALS ON NEW TOOLS FOR VIDEO COMPRESSION TECHNOLOGY**

**Source: Video**

**Status: Approved**

## **1 Introduction**

In response to the Call for Evidence Justifying the Testing of Video Coding Technology (N3318), issued in March 2000, several contributions were presented at the July meeting. The results of those contributions were reviewed informally. Based on the results of that review, it was concluded to issue a Call for Proposal (CfP) for submission and formal testing of new video compression tools for possible inclusion into existing or future MPEG standards. A previous call for proposals was issued in December 2000 but due to a lack of MPEG-4 anchor sequences of sufficient quality, this call has been reissued. Previous registrants (for the December 2000 call) MUST re-register for these tests.

Results of the formal subjective tests will be made public, but WG11 cannot, prior to having results of the tests, commit to any course of action regarding the proposed technology.

## **2 Timeline**

January 19 27, 2001	Final Call for Proposals
March 16, 2001	Deadline for formal registration
July 1, 2001	Deadline for submission of coded test material
July 9-13, 2001	Start of Subjective Test
July 23-27, 2001	Evaluation of Subjective Test

## **3 Test Parameters and Conditions**

The coding conditions that are to be used for testing the coding efficiency are specified below. Proposals may be put forward in one or both bit rate classes. However, for each class, results for all bit rates and all sequences must be submitted.

<b>Video Coding Efficiency Tests</b>						
Bit rate class	Low bit rate			Medium bit rate		
Sequences	Foreman, News, Container, Tempete			Bus, Mobile and Calendar, Flower Garden, Tempete		
Resolution	QCIF (176x144)		CIF (352x288)	CIF (352x288)		
Bit rate	32 kbps	64 kbps	128 kbps	256 kbps	512 kbps	1024 kbps
Input frame rate	10 Hz	15 Hz	15 Hz	15 Hz	30 Hz	30 Hz
Test Case Identifier	A	B	C	D	E	F

Below are the common encoding conditions that shall be followed by the submitters of new technology and by the MPEG-4 reference encoder.

- No rate control shall be used. The following methods are allowed to achieve the target bit rate:
  1. The first 2/3 of the sequence must use fixed quantizer fidelity settings (e.g., fixed QP).
  2. Different quantizer settings are allowed for a small number of broad classes of picture types (e.g. one for I, one for P, one for B).
  3. One adjustment to quantization parameter allowed only near end of sequence to achieve total target rate.
  4. Complete information regarding how the bit rate was achieved shall be provided in the proposal description document.
- 2% overshoot, 10% undershoot tolerance on specified output file sizes. Target file size is described in Appendix A.
- Single pass coding only (no multi-pass, except to set the bitrate).
- 5. Encoding look-ahead / latency is limited to three-picture look-ahead (e.g., allowing up to three B pictures between P pictures or 3-D transform coding of four-picture units).
- 6. No pre-filtering before encoding is allowed, but filtering as part of the encoding process is allowed if some compensation for that filtering is required by the decoding process.
- Post processing including in-loop filtering is permitted.
- No error resilience characteristics will be tested.

## 4 Test Process

The test process will be conducted essentially as used in previous MPEG formal subjective test evaluations. Evaluation will be conducted on a double-stimulus continuous quality scale as specified in ITU-R BT.500.10. Tests will be conducted by expert MPEG evaluators selected at the March MPEG meeting, and by additional evaluators as needed by FUB. Evaluation will be conducted by six groups of three people. Test subjects will be screened for normal visual acuity and color resolution using methods to be determined.

Some aspects of the testing methods may be altered relative to the prior methods as determined by MPEG at the March MPEG meeting. The particular aspects under consideration for the final test design are described below in this section.

In particular, due to the wide range of applications addressed by MPEG video coding tools, and use of close viewing distances in many applications, MPEG may reduce the recommended ITU-R BT.500.10 viewing distances, for example, to 3 screen heights. It is anticipated that coding artifacts will be significantly more visible at these distances.

Tests are to be conducted using progressive scan monitors. These monitors will be fed VGA signals from custom video computer hardware and software. QCIF content may be scaled horizontally and vertically by ~2X or ~4X and CIF content by ~2X using typical scaling techniques (e.g., University of Hannover software as used in previous tests). Details of these tools will be available on the ad-hoc group reflector.

#### 4.1 Schedule and Interim Work Items to be Conducted by MPEG

Schedule	Item	Participant
January 19	Distribution of test material	Ulrich Benzler University of Hannover <a href="ftp.tnt.uni-hannover.de">ftp.tnt.uni-hannover.de</a>
January 19	Identification of Bank Account and treasurer information.	Klaus Diepold, Dynapel Labs <a href="mailto:Klaus.Diepold@dynapel.de">Klaus.Diepold@dynapel.de</a>
February 15	Determination of costs and distribution of registration materials	Mark Buxton ( <a href="mailto:Mark.J.Buxton@intel.com">Mark.J.Buxton@intel.com</a> )
March 16	Registration materials collection	Mark Buxton, Intel Corp.( <a href="mailto:Mark.J.Buxton@intel.com">Mark.J.Buxton@intel.com</a> )
May 18	Preparation and distribution of MPEG-4 Anchor Candidates	Addressed in the “Call for MPEG-4 Participation”, N3909
June 1	<ol style="list-style-type: none"><li>AHG meeting to discuss anchor candidates and compare with reference software</li><li>Final decision amongst candidates for use as Anchors</li></ol>	Ad-hoc group members
June	Collection of proposal submissions and anchor sequences	Mark Buxton <a href="ftp://ftp.tnt.uni-hannover.de">ftp://ftp.tnt.uni-hannover.de</a>
July 2-6	Preparation of test sequences	TBD
July 8	Test facility setup	Vittorio Baroncini
July 9-13	Conduct of tests	Fub
July 16-20	Data entry and Statistical Analysis	FUB and Ad-hoc group members

#### 4.2 Testing Facilities

Testing will be conducted at FUB in Italy. Full details will be provided upon registration.

### 5 Proposal Fees

Proponents are likely to be charged a fee per submitted algorithm proposal. Such fee will be a flat charge for each compression proposal. Additional fees will be charged for multiple algorithm proposals. Proponents are encouraged but not required to submit tests for both rate classes. Proponents will be charged an identical fee for submitting Low or Medium or both rate classes. The fee is non-refundable after the formal registration deadline has passed.

#### Example:

Alice submits two proposals. Proposal one has Low and Medium bit rate classes and a total of 16 sequences. Proposal two has only Low bit rate classes. Alice will be charged 2X the fee because she has two proposals.

No fee will be charged to accredited international open standards organizations wishing to submit proposals.

Fees collected in excess of expenses will be distributed to the registrants proportional to their original payment.

### 6 MPEG-4 Anchor Reference Material

Reference and other MPEG-4 encoder software will be used to generate anchor reference material. The following configuration will be used with this encoder:

- Full Search Motion Estimation.
- Advanced Simple Profile for MPEG-4 (best possible quality - optimized coding tools per sequence)
- Anchor materials may originate from reference software or 3<sup>rd</sup> party contribution.

## 7 Content Description

Distributed material will contain exactly the pictures to be coded, 10s or less, starting from beginning of sequence (proponent is responsible to check and ensure they are using the correct test material).

Content will be uncompressed 8 bit per sample YCbCr 4:2:0 CIF and QCIF at 10, 15, and 30 frames per seconds.

Content will be available for download from

Location: [ftp.tnt.uni-hannover.de/testsequences](ftp://ftp.tnt.uni-hannover.de/testsequences)

User: videocfp

Password: FR54Wine

Video content will be distributed in .RAW (4:2:0) file format with no header, using one file for each entire sequence (first is the data for the Y component of the first picture then Cb, then Cr, then the second picture in a similar fashion, then the third picture, etc.). Naming will follow the format “X\_TC\_Y\_N\_yuv.zip”, where:

X = Content Identifier: {FOREMAN, NEWS, CONTAINER, TEMPETE, , BUS, MOBILANDCALENDAR, FLOWERGARDEN, }

TC = Test Case Identifier (from MPEG Coding efficiency Tests table above)

Y = 00 for distributed source material; Y=01 for MPEG-4 final selected reference; Y=Unique submission identifier (assigned after registration) for proposals.

N = revision number. Only the largest (most recent) revision uploaded to the site will be considered.

## 8 Submission Requirements

Registered proposers are requested but not required to submit proposals. Those wishing to submit proposals must include the following:

1. Compressed bitstreams
2. A technical description sufficient for conceptual understanding and generation of equivalent performance results by experts, including conveying a conceptual understanding of the type and degree of encoding compression efficiency optimization necessary to produce the performance. This description should include all data processing paths and individual data processing components used to generate the bitstreams. It need not include bitstream format or implementation details.
3. Uncompressed result of decoding the compressed bitstreams.
4. An executable decoder (no specific requirement on execution environment is specified).

Proposers are requested to provide information describing computational complexity, implementation complexity, memory requirements, encoding and decoding latency, implementation issues on specific hardware and software platforms, error robustness, and any special features present in the proposal.

Uncompressed content will be submitted to [ftp.tnt.uni-hannover.de](ftp://ftp.tnt.uni-hannover.de) in the same format as described above for the distribution of source material. The upload directory and passwords will be available upon registration.

Compressed bitstreams will be submitted using the naming convention X\_TC\_Y\_N\_bits.zip (with X, TC, Y, and N as described in the above section) and the decoder executable (one decoder executable per proposal, not per bitstream) will be submitted using the naming convention X\_TC\_Y\_N\_xxxx.zip, where “xxxx” is a descriptive character string chosen by the proponent to describe the executable format (e.g., “exe”).

Registered respondents to the call for proposals are invited to attend the 56<sup>th</sup> MPEG meeting as technical experts in case last-minute adjustments to video test conditions are needed.

## 9 Evaluation Criteria

The primary functionality addressed by these tests is coding efficiency. Evaluation criteria for the quality of the video will be based on the results of subjective tests by experts. In subsequent evaluations, MPEG may consider other issues such as implementation complexity, error resilience, etc.

Data collection, analysis, and summary of results of subjective tests will be performed prior to the March MPEG meeting. Evaluation of results of the tests will be conducted at the March MPEG Meeting.

## 10 Further Information

For further information, please contact:

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## 11 Annex A – Registration Information

Registration will be via e-mail to [Mark.J.Buxton@intel.com](mailto:Mark.J.Buxton@intel.com). Registrants MUST include the words “MPEG CFP REGISTRATION” in the subject line of the message. Each registration must contain the following information:

1. Name
2. Title
3. Organization / Company
4. Return e-mail address
5. Number of intended contributions (this is REQUIRED if greater than 1) (for example, “I intend to submit seven algorithm proposals”). Multiple submissions by a single proponent are not encouraged.

Optionally, the following additional information is requested

1. Bit rate categories to be submitted (i.e. Low and/or Medium)
2. Description of intended contribution
3. Additional remarks

Any registration is not complete until the proponent has received an acknowledgment via return e-mail and the fee has been received. Payment is accepted as cash, check, or wire transfer to an account specified in the acknowledgement.

The return e-mail will contain the following information:

1. A unique identifier per contribution to be used in the file name of the company’s data submissions and for future reference.
2. Details about the logistics including directions and accommodations at the Intel test facilities.
3. The amount of the fee (in \$US) – currently estimated to be about \$800.
4. Password and details about ftp site for submission upload.

## 12 Annex B – Sequence Information

Sequence	Target Compressed File Size (Bytes)	Number of Frames
Foreman A	40 000	100
Foreman B	80 000	150
Foreman C	160 000	150
News A	40 000	100
News B	80 000	150
News C	160 000	150
Container A	40 000	100
Container B	80 000	150
Container C	160 000	150
Tempete A	34 667	87
Tempete B	69 333	130
Tempete C	138 667	130
Tempete D	277 333	130
Tempete E	554 667	260
Tempete F	1 109 333	260
Bus D	160 000	75
Bus E	320 000	150
Bus F	640 000	150
Mobile D	266 667	125
Mobile E	533 333	250
Mobile F	1 066 667	250
Flower D	266 667	125
Flower E	533 333	250
Flower F	1 066 667	250