

**INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO/IEC JTC 1/SC 29/WG 11
CODING OF MOVING PICTURES AND AUDIO**

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ITU-T Q.6/SG16 and ISO/IEC JTC 1/SC 29/WG11
for the Development of new Video Coding Recommendation and International
Standard
Status: Approved

**Terms of Reference for a
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Recommendation and International Standard**

1.0 Goals, Scope and Intent of the Joint Project

These Terms of Reference (ToR) apply to the joint project of ITU-T Q.6/SG16 (“VCEG”) and ISO/IEC JTC1/SC29/WG11 (“MPEG”). In the following the two organisations, or higher-level committees of VCEG (SG 16) and MPEG (SC 29), respectively, when required, will be called “parent bodies”.

The goal of the joint project is to develop a new video coding standard satisfying the high-level requirements set forth in Annex 1 and according to the preliminary schedule set forth in Annex 2. The work will have as starting point the current draft ITU-T H.26L developed by VCEG that has proved to provide the most advanced results in the tests carried out by MPEG in June 2001.

The scope of the joint project will be the development of a new video coding standard and the assessment of its performance at the completion of the work using formal subjective testing procedures.

The intent is that the ITU-T Recommendation and ISO/IEC International Standard be technically aligned, fully interoperable with each other for all of the video codec’s conformance points specified during the term of this joint work, and offer the best possible technical performance under the practical constraints of being implementable on various platforms and for various applications enabled by the relevant ITU-T Recommendations and ISO/IEC International Standards. Common text will not be used in the interest of minimising co-ordination overhead.

The scope of the project is the joint development or definition of:

- Requirements finalization using inputs from the parent bodies
- Video coding syntax
- Formatting of the video syntax for transport over a variety of networks, while keeping any aspects necessary for use with a specific transport system outside the scope of the joint video specification,
 - For example, it is within the scope to

- define common aspects of a format appropriate to support bitstream-oriented use, e.g., in H.320 or in MPEG-2/MPEG-4 Systems
- define common aspects of a format appropriate to support packet-oriented use (e.g., for encapsulation into RTP)
- For example, it is not within the scope to specify any H.32x-specific carriage aspects (more appropriate for only an ITU Recommendation), any MPEG Systems specific aspects (more appropriate for only an ISO/IEC Standard), and any RTP encapsulation (more appropriate for only an IETF RFC).
 - Interoperability conformance points (Profiles, and Levels)
 - Development of conformance test data

The resulting text will be converted by the parent bodies and higher-level committees into the appropriate ITU-T Recommendation and ISO/IEC International Standard.

2.0 Joint Group

The work of the project will be conducted by a jointly-constituted experts group which will be known as the Joint Video Team (“JVT”).

JVT will operate as a joint group under the ordinary policies and procedures of both organisations. In the event of differences between policies of ISO/IEC and ITU-T not covered by these ToR, the JVT Rapporteur|Chair will decide the issue, based on the consensus of the experts and if necessary in consultation with the parent bodies, in the best interests of standardization.

3.0 Deliverables of the Joint Project

The deliverables are a new video codec informally called the JVT codec, to be approved by ITU as an ITU-T Recommendation and by ISO/IEC as an International Standard. These deliverables will be developed with requirements as described.

4.0 Dissolution

The joint group will dissolve when the approval process for the new Recommendation and International Standard in both organisations is completed. The joint group may also be dissolved at the initiative of one or both the parent bodies if unexpected conditions materialise that require one or both of the parent bodies to take this action.

Potential new joint work beyond the duration of this project (e.g., extensions, corrigenda, amendments, etc.) will require the agreement of the two parent bodies. It is anticipated that such agreement would be reached in case the need for a corrigendum is discovered.

5.0 Meetings

JVT meeting venue and dates will be proposed by the JVT Rapporteur|Chair, and authorized by the parent bodies under the customary practices of both organisations.

JVT meetings will be held as an entity that is separate from the two parent bodies, and will operate under rules set forth in Annex 3 of this ToR.

The meeting dates and locations should be co-ordinated with those of meetings of the ITU-T SG16 and ISO/IEC JTC 1/SC 29/WG 11 (e.g. on an alternating basis if feasible for the progress of the project) in order to reduce the amount of travelling for participants and will be preferably co-located with a parent body meeting and held immediately before, during, or after the corresponding SG16 meetings or during the corresponding WG 11 meeting dates.

6.0 Management

The management of the JVT will consist of a jointly-appointed Rapporteur|Chair and two Associate Rapporteurs|Co-Chairs (one each as appointed from the parent bodies with joint consent), reporting to the parent bodies. Changes in the management team must be agreed by the two parent bodies.

7.0 Participation in JVT meetings

Meetings will be open to, and contributions accepted from, all parties qualified for participation in meetings according to the rules of either parent body. Experts may be invited by the Rapporteur|Chair, as permitted by ITU-T | ISO/IEC policies.

All contributions and all participants will have equal status in the technical work and will be considered on the same terms.

8.0 Documents and Contributions

JVT will maintain a document registry and electronic distribution archive. The registry and archive will be linked to both the ITU-T Q.6/SG16 and ISO/IEC JTC 1/SC 29/WG 11 web sites.

Any document from a participant in the meeting should be available to all the participants before the meeting through the use of electronic document handling. A registration and uploading deadline several days in advance of the start of the meeting will be announced for each meeting. A “late, unannounced” document hand-carried to the meeting should be accepted only with the consensus of the meeting participants. This policy will be stated in the invitation letter that is provided for every meeting to both organisations.

All documents and contributions will be in electronic form (preferably MS Word).

In order to facilitate cross-organisational communication, all input and output documents will be public unless the contributor of an input document indicates otherwise. In that circumstance, the document will be accessible only through a private, password-protected site accessible only to ITU/ISO/IEC members and invited experts regularly attending the JVT meetings. Invited experts not regularly attending JVT meetings may be given access to such documents upon approval of its author.

9.0 Working Methods

9.1 General Policies and Procedures

All group decisions will be made by the consensus of the JVT experts as determined by the JVT Chair|Rapporteur. All contributions related to the joint project must be addressed to JVT for the duration of the joint project, rather than to the individual parent bodies. Additionally, these may also be submitted to any of the parent bodies (according to their specific document submission procedures), if the author of the contribution so determines.

The general rules for handling new proposals, and general policies are described in Annex 3.

9.2 Working relationship between JVT and the parent bodies

The parent bodies may like to provide inputs (either in the form of written documents or by holding meetings with the appropriate parent body sub-groups) on the work carried out by JVT. A non-exhaustive list includes:

1. Further details on the high-level requirements already given in Annex 1.
2. New requirements dictated by new applications that may be served by the new video coding
3. Complexity analysis of the solutions being adopted
4. Partitioning of the video coding tool space in profiles
5. Definition of levels
6. Requirements for the design of verification tests
7. Profiles to be tested in the verification tests.

JVT will consider the inclusion of these inputs in its work, also considering the impact of such inputs in the other parent body’s requirements. JVT will report back to the originating organisation on the action taken.

9.3 Document Control

JVT will maintain a single master draft document and a single reference software codebase for the developing video coding standard, each under the control of a single editor, appointed by the JVT

Chair|Rapporteur with the consensus of the experts. The document and codebase will contain the exact text to be submitted to the parent bodies for approval. For maintenance of the text, see Section 4 (“Dissolution”).

10.0 Patent and Copyright Issues

The project and joint group will progress the project work in compliance with the Intellectual Property Rights (“IPR”) policies and IPR reporting requirements and procedures of both organisations (<http://www.itu.int/ITU-Databases/TSBPatent/> and <http://www.itscj.ipsj.or.jp/sc29/29w7ipr.htm>).

JVT will define a “baseline” profile. That profile should be royalty-free for all implementations. The performance of this profile will particularly be the subject of performance verification tests.

JVT’s rules for the implementation of the IPR policy are contained in Annex 3.

11.0 Liaison Statements

The JVT will conduct liaison communications. All incoming liaison statements received by the parent bodies that have relevance to the JVT work will be forwarded to the JVT. The JVT may approve output written communications by a consensus of the JVT experts. All output liaison statements approved by the JVT will indicate the level of approval and be posted on the JVT FTP site, and provided to the experts. All outgoing liaison statements will undergo review and consent by both parent bodies (VCEG and MPEG, if necessary in consultation with higher-level committee management) before official transmittal to their addressee.

12.0 Meeting Reports

A meeting report will be provided by the JVT management shortly after the conclusion of each meeting and will be submitted to ITU TSB and ISO/IEC JTC 1/SC 29/WG 11, posted on the group’s FTP sites, and distributed to the experts.

The report should include:

- Dates and venue
- Chairpersons/Rapporteurs of the meeting
- Attendance list with affiliation
- Agenda of the meeting
- List of documents considered with source
- Summary of results and an outline of any outstanding issues or resolutions
- Any outgoing liaison statements/communications sent to other organisations
- Future activities

13.0 Promotion and Public Relations Activities

Any public relations or promotional activities regarding the joint group, its project, and its results and deliverables will be approved by the JVT Chair|Rapporteur with the consensus of the experts. All promotion and public relations activities will undergo review and consent by both parent bodies (VCEG and MPEG, if necessary in consultation with higher-level committee management).

Annex 1: High-level requirements for Joint VCEG-MPEG Video Coding Project

- Simplification “back to basics” approach
 - adoption of a generally simple, straightforward design using well-known building blocks
 - for example, use of a minimal number of VLC tables for all parameters to be coded
 - for example, targeting a simplified design knowing that full backward/forward compatibility is not achievable
 - minimum number of conformance points
- High compression performance
 - having a capability goal of 50% or greater bit rate savings from H.263v2 (with Annexes DFIJ&T) or MPEG-4 Advanced Simple Profile at all bit rates
- Flexible application to delay constraints appropriate to a variety of services
 - low delay (e.g., no B pictures) for real-time conversational services
 - higher delay usage appropriate for storage or sever-based streaming application
- Network friendliness
 - ease of packetization
 - information priority control
 - application to video streaming services
- Error resilience
 - packet loss resilience
 - mobile channel corruption resilience
- Complexity scalability in encoder and decoder
 - asymmetry of encoder and decoder processing complexity
 - scalability between amount of encoder processing and achievable quality
- Full specification of decoding (no mismatch)
 - resolve mismatch problem (e.g., integer transform, VQ,...)
- High quality application
 - performance improvement in higher bitrate
 - applicability to entertainment-quality applications
- File storage support
 - simple stream exchange
 - http streaming service
 - random access
 - support of multiple streams with transitions

Annex 2: Preliminary Schedule for Joint VCEG-MPEG Video Coding Project

Approx Date	Auspices	Possible Location	Project Milestone
Dec, 2001	JTC1	Pattaya	JM1, JWD 1
Feb, 2002	ITU-T	Geneva	JM2, JWD 2
May, 2002	ITU-T & JTC1	Fairfax, VA	JM3, CD
Jul, 2002	JTC1	Klagenfurt	JM4, FCD
Oct, 2002	ITU-T	Geneva	JM5, AAP Consent
Dec, 2002	JTC1	TBD	JM6, FDIS & Rec.
Feb, 2003	<Ballot Result>	N/A	IS

The schedule for the definition of conformance tests is yet to be determined, but is expected to shortly follow the schedule for the text of the codec definition itself.

Annex 3: JVT Internal Operating Rules

1. Abstract

This annex defines rules the JVT will use for the future standardization process of the JVT video codec. Agreement of the two parent bodies (VCEG and MPEG, if necessary in consultation with higher-level committee management) is needed for modification of these rules.

These rules cover Intellectual Property Rights (IPR; patents and copyright) for the JVT codec, the Profile-Level framework, and submission and handling of technical proposals to JVT.

The ultimate purpose of the standardization effort is **not** to develop an official Recommendation/International Standard providing the highest possible theoretical performance, but to encourage **actual interoperability between implementations in the field**, at the highest practical level of performance. “Optional” modes which are unlikely to be commonly implemented do not enhance performance in the field, despite any theoretical advantages. This observation drives many of these rules.

The rules help to ensure maximal interoperability and simple capability negotiation of systems employing the JVT codec.

Note that all these rules apply only to the described types of proposals. These rules do not apply to informative or discussion contributions.

2. Definitions

The **Baseline** profile is the common set of features supported by all JVT decoder implementations, without exception. The Baseline profile supports video communication between all systems (although possibly requiring some non-transcoding gateway capability).

A **Profile** is defined by a set of feature capabilities supporting a particular tradeoff between performance and complexity within the encoder or decoder implementation. Applications which require similar tradeoffs between these parameters should use the same Profile.

A **Level** describes performance parameters within each Profile, which describe upper limits on decoder capability. Performance parameters may include maximum picture size, macroblocks per second, bitrate, and similar parameters. See the Joint Test Model (JM) document for a list of Levels.

3. IPR Policy & Guidelines

3.1 Basic IPR Principles

Regarding Intellectual Property Rights (IPR) for the JVT codec, JVT has agreed to the following basic principles:

- The JVT codec should have a simple royalty free “baseline” profile (both on the encoder and decoder) in order to promote the wide implementation and use of the JVT codec. All implementations should have such a common baseline profile core, in order to allow minimal interoperability among all JVT codecs. The above requirement means that all technology applied in the baseline profile shall have no IPR, expired IPR, or valid but royalty-fee-free IPR (according to Box 2.1 or 2.2.1 of the JVT Patent Disclosure form, as shown below).
- Special, more advanced profiles of the JVT standard may contain patents per Box 2.2 of the JVT Patent Disclosure form (reasonable terms and conditions).

3.2 Collection of IPR information during the standardization process

According to the ITU-T and ISO/IEC IPR policy, members/experts are encouraged to disclose as soon as possible IPR information (of their own or of anyone else’s) associated with any standardization proposal (of their own or anyone else’s). Such information should be provided on a best effort basis.

For collecting such information, JVT has decided to use it’s own Patent Declaration form – note that this is distinct from the *ITU ISO IEC Patent Statement and Licensing Declaration* that is to be submitted to the ISO Secretary General and ITU TSB Director when the contributed technology becomes part of the final standard.

Therefore, **JVT requires all technical (algorithmic) proposals include the following:**

Attached at the end of each technical contribution, a **fully filled-out “JVT Patent Disclosure form”** (as shown below in this document). At the contribution stage, this form is for information only, and **may be signed by an expert or left unsigned**. The form **must be included in the contribution to JVT**,

Additionally, **all submitted source code must include a written transfer of copyright** in the form described in section 5 below.

Note that the submission of the JVT Patent Disclosure form at the proposal stage does not have the same formal status as the final IPR declaration to the ITU TSB and ISO/IEC, which must be done in the approval process for the ITU-T Recommendation and ISO/IEC International Standard.

Such information provided to the Chair | Rapporteur will be tabulated in a “IPR status list” (e.g. a simple Word table) of the information received. Information not currently relevant (e.g. if a proposed method was not accepted) will be removed from the “IPR status list” as early as possible. The “IPR status list” is a living document of the JVT.

3.4 Outlook

It is hoped that the above implementation would facilitate to achieve the goals outlined under paragraph 3.1.

4. Rules for JVT itself

- a) JVT shall ordinarily define each Level for a given Profile to require support of all lower-numbered Levels (L) for the same Profile (P). Therefore, when an endpoint signals Pa Lc, this indicates the ability to operate in any mode Profile a, Level (1..c).

For example, PZ L2 requires support for PZ L1, and PZ L2. It **does not** require support for PZ L3.

- b) JVT shall not begin the formal approval process for the JVT Recommendation | Standard or any Annex(es) thereof, until the complete C-code for that technical content has been shown to work and test bitstreams have been generated and tested on the C-code model.
- c) Contributed proposals which do not comply with the following rules will be considered by JVT only with the consensus of the group, and only if time is available after consideration of normal proposals. JVT may reach a tentative conclusion regarding such non-compliant proposals, but no proposal shall be formally accepted until the contributor supplies the required materials, and these are approved by JVT.

5. Rules for Technical (algorithmic) Proposals

All technical proposals for algorithms to be included in one or more Profile-Levels shall include:

- a) **The results of a reference implementation relative to the official JM test model design.**

In the case of enhancements or evolutionary developments of algorithms already present in JM-n, the results must be based on the most recent JM-n. In the case of algorithms that address fundamentally new issues, it is sufficient that the software is relative to the earlier JM n-1. This requirement is distinct from the requirement of timely inclusion of the software implementation into JM n+1 in case of adoption (see below).

- b) **A textual description** that fits into the current structure of the Joint Test Model, **and a change-bar version of JM n** including the new proposal, as a hint to the editor how the resulting JM n+1 may look like.
- c) **A written transfer of copyright in the contributed C-code to the ITU and ISO/IEC.** As the JVT C-code model is a collaborative work by the JVT experts, copyright on the jointly-developed software code shall reside in the ITU and ISO/IEC, and contributors must agree to this condition.

Contributors of software code *retain the right to do whatever they wish with software they have contributed*. Contributors also *retain full patent rights in their contributed algorithms*, according to the ITU-T and ISO/IEC Patent Policies. The ITU and ISO/IEC will grant, free of charge, the right to use this software or variations on this software to anyone for purposes of

implementation of the standard. JVT intends to include the final C-code version of encoder and decoder into the standard in the form of some normative or informative part of the standard (at the discretion of the group).

As a starting policy JVT members may use either the existing VCEG copyright license or the WG11 copyright license. In the interim software with the WG11 copyright license should be produced in a modularised way so as to store the source code with the WG11 copyright license in identified separate directories. JVT and its parent bodies will establish, as soon as possible, a copyright handling method for contributed software. The software should be developed and made publicly available in a manner that explicitly grants users of the software the right to use the software for implementations of the Recommendation | Standard.

IMPLEMENTATION OF RULES (a), (b), (c)

Only for rules (a), (b) and (c) above, the contributor does not need to include these items in an initial contribution to JVT. In the case that JVT tentatively accepts the proposal, this will be noted in the JVT Meeting Report, and the contributor is then required to supply items (a), (b) and (c) before formal inclusion of the proposal. The JVT Document Editor and Source Code Coordinator have the discretion to accept items (a), (b), and (c) between JVT meetings. Such acceptance shall be notified to and reviewed by JVT at their next meeting.

d) **An intellectual property (patent) statement.** This shall be in the format given below.

e) **Performance and complexity analysis in a form to be established by the JVT.**

JVT will choose proposals that in the opinion of the experts, best meet the Requirements for the Profile-Level combination.

It is the policy of JVT that all technical results shall be confirmed by independent implementations tested under common conditions. At the discretion of JVT, technical results may be confirmed by submission of source code software to be tested under common conditions.

Note: In a later stage of the standardization process it may be desirable to have less strict rules for inclusion into the JM provided that syntax and semantics of the bitstream/packetstream remain unchanged.

JVT Patent Disclosure Form

International Telecommunication Union
Telecommunication Standardization Sector



International Organization for Standardization



International Electrotechnical Commission



Joint Video Coding Experts Group - *Patent Disclosure Form*

(Typically one per contribution and one per Standard | Recommendation)

Please send to:

JVT Rapporteur Gary Sullivan, Microsoft Corp., One Microsoft Way, Bldg. 9, Redmond WA 98052-6399, USA
Email (preferred): Gary.Sullivan@itu.int Fax: +1 425 706 7329 (+1 425 70MSFAX)

This form provides the ITU-T | ISO/IEC Joint Video Coding Experts Group (JVT) with information about the patent status of techniques used in or proposed for incorporation in a Recommendation | Standard. JVT requires that all technical contributions be accompanied with this form. *Anyone* with knowledge of any patent affecting the use of JVT work, of their own or of any other entity (“third parties”), is strongly encouraged to submit this form as well.

This information will be maintained in a “living list” by JVT during the progress of their work, on a best effort basis. If a given technical proposal is not incorporated in a Recommendation | Standard, the relevant patent information will be removed from the “living list”. The intent is that the JVT experts should know in advance of any patent issues with particular proposals or techniques, so that these may be addressed well before final approval.

This is not a binding legal document; it is provided to JVT for information only, on a best effort, good faith basis. Please submit corrected or updated forms if your knowledge or situation changes.

This form is *not* a substitute for the *ITU ISO IEC Patent Statement and Licensing Declaration*, which should be submitted by Patent Holders to the ITU TSB Director and ISO Secretary General before final approval.

Submitting Organization or Person:

Organization name _____
Mailing address _____
Country _____
Contact person _____
Telephone _____
Fax _____
Email _____
Place and date of submission _____

Relevant Recommendation | Standard and, if applicable, Contribution:

Name (ex: “JVT”) _____
Title _____
Contribution number _____

(Form continues on next page)

Disclosure information – Submitting Organization/Person (choose one box)

2.0 The submitter is not aware of having any granted, pending, or planned patents associated with the technical content of the Recommendation | Standard or Contribution.

or,

The submitter (Patent Holder) has granted, pending, or planned patents associated with the technical content of the Recommendation | Standard or Contribution. In which case,

2.1 The Patent Holder is prepared to grant – on the basis of reciprocity for the above Recommendation | Standard – a free license to an unrestricted number of applicants on a worldwide, non-discriminatory basis to manufacture, use and/or sell implementations of the above Recommendation | Standard.

2.2 The Patent Holder is prepared to grant – on the basis of reciprocity for the above Recommendation | Standard – a license to an unrestricted number of applicants on a worldwide, non-discriminatory basis and on reasonable terms and conditions to manufacture, use and/ or sell implementations of the above Recommendation | Standard.

Such negotiations are left to the parties concerned and are performed outside the ITU | ISO/IEC.

2.2.1 The same as box 2.2 above, but in addition the Patent Holder is prepared to grant a “royalty-free” license to anyone on condition that all other patent holders do the same.

2.3 The Patent Holder is unwilling to grant licenses according to the provisions of either 2.1, 2.2, or 2.2.1 above. In this case, the following information must be provided as part of this declaration:

- patent registration/application number;
- an indication of which portions of the Recommendation | Standard are affected.
- a description of the patent claims covering the Recommendation | Standard;

*In the case of any box **other than 2.0** above, please provide the following:*

Patent number(s)/status _____

Inventor(s)/Assignee(s) _____

Relevance to JVT _____

Any other remarks: _____

(please provide attachments if more space is needed)

(form continues on next page)

Third party patent information – fill in based on your best knowledge of relevant patents granted, pending, or planned by other people or by organizations other than your own.

Disclosure information – Third Party Patents (choose one box)

3.1 The submitter is not aware of any granted, pending, or planned patents *held by third parties* associated with the technical content of the Recommendation | Standard or Contribution.

3.2 The submitter believes third parties may have granted, pending, or planned patents associated with the technical content of the Recommendation | Standard or Contribution.

For box 3.2, please provide as much information as is known (provide attachments if more space needed) - JVT will attempt to contact third parties to obtain more information:

3rd party name(s)

Mailing address

Country

Contact person

Telephone

Fax

Email

Patent number/status

Inventor/Assignee

Relevance to JVT

Any other comments or remarks: