

Thirteenth Meeting: Austin, Texas, USA, 2-4 April, 2001

Question: Q.6/SG16 (VCEG)

Source: Gary Sullivan, Q.6 Rapporteur
Microsoft Corp.
One Microsoft Way
Redmond, WA 98052 USA

Tel: +1 (425) 703-5308
Fax: +1 (425) 936-7329
Email: Gary.Sullivan@itu.int

Thomas Wiegand, Q.6 Associated Rapporteur
Heinrich Hertz Institute (HHI)
Einsteinufer 37
10587 Berlin, Germany

Tel: +49 - (0)30 - 31002 617
Fax: +49 - (0)30 - 392 72 00
Email: wiegand@hhi.de

Title: Detailed Agenda and Document Allocation

Purpose: Information

1.0 Opening plenary

1.1 Organizational Items

1.1.1 Meeting logistical information

1.1.2 Generating attendee list [VCEG-M02](#)

1.1.3 Reviewing experts list [VCEG-M03](#)

1.1.4 Meeting invitation for this meeting [VCEG-M-TD-0](#)

1.1.5 Comments regarding ITU-T patent disclosure policy
<http://www.itu.int/ITU-Databases/TSBPatent/>

1.2 Review of previous meeting report

1.2.1 Report of 12th meeting, Eibsee, Germany [VCEG-M01](#)

1.3 Document review [VCEG-M00](#)

1.4 Review of meeting plan [VCEG-M-TD-1](#)

1.5 Future meeting plans

1.5.1 SG16 Meeting, Porto Seguro, Brazil, 28 May – 8 June '01
(delayed contribution deadline 16 May)

1.5.2 2-3 Rapporteurs' group meeting

1.5.3 SG16 Meeting, Geneva, Feb/March '02

1.6 Report of ad-hoc committees

1.6.1 Test model and software [VCEG-M04](#) (software status, TML 5.91 used for experiments released in mid March, TML 6 just released, code is very slow, doesn't work on 64-bit integer machines)

1.6.2 H.26L development [VCEG-M05](#) (comments on search range, code missing good intra refresh for error resilience, should discuss issue of multiple common conditions, etc.)

- 1.6.3 H.26L complexity [VCEG-M06](#) [add Lulin Chen]
- 1.6.4 H.26L profiles & applications [VCEG-M07](#) (try to start with just two profiles, one called baseline and the second adding B pictures for higher-latency applications?)
- 1.7 Liaison statements and collaborative letters received
 - 1.7.1 From ISO/IEC JTC1/SC29/WG11 re video tests [VCEG-M41](#)
(Wait until SG16 meeting & plan to send an LS)
 - 1.7.2 From ITU-R SG6 re high-definition television [VCEG-M42](#)
(Wait until SG16 meeting & plan to send an LS: MPEG-2&4 have 4:2:2 & 4:4:4, inform re MPEG DCinema & potential for H.26L application)
- 1.8 Coordination with other organizations
 - 1.8.1 With ISO/IEC JTC1/SC29WG11
 - 1.8.1.1 Video compression testing
[VCEG-M09](#) (call for proposals)
[VCEG-M49](#) (possible anchor sequences, R-D optimization similar to H.263 test model, gives gain, B pictures help a lot, 1/4-sample helps significantly – at least in PSNR, some gain but less for global motion compensation, MPEG-2 quantization, H.26L now probably has less R-D optimization than this)
 - 1.8.1.2 Digital cinema application & testing
[VCEG-M10](#) (call for proposals – ensure not lose focus on telecom and try to ensure interop goal of future work with MPEG future work, but try to avoid duplication of future work item efforts and work toward interoperability, let's run some preliminary tests on digital cinema content to see how it works, send liaison letter and perhaps ask for more time? Thomas Wiegand volunteers to coordinate AHG on this, deadline for payment 13 April, brainstorming in a night session at this meeting to see what can get started)
[VCEG-M11](#) (evaluation procedures)
[VCEG-M12](#) (preliminary test methodology)
[VCEG-M65](#) (requirements)
[VCEG-M66](#) (test materials submission guidelines)
[VCEG-M67](#) (call for test equipment)
[VCEG-M70](#) (sample letter for contributions)
 - 1.8.1.3 Video-related metadata [VCEG-M13](#)
 - 1.8.2 With ITU-T Q.1/16 on H.263 Annex X and H.242 [VCEG-M15](#)
(supported by the group)
- 2.0 H.26L development
 - 2.1 General status of work [VCEG-M05](#), [VCEG-M27](#) (20% not enough, relative to the highest-performance available, NAL, need IPR info) Review of policy guidelines
 - 2.2 Applications, profiles, and common conditions
[VCEG-M53](#) (3G mobile devices),
[VCEG-M55](#) (3G conversational and streaming on RTP/IP, common conditions),
[VCEG-M56](#) (like the NAL concept, significant bugs found in TML5.9 and in H.223 mux software, one slice per frame much worse than one slice per GOB, some UEP and with UEP, need error resilience tools in software, assume header compression) **bug fixes adopted**

Discuss offline – What are the differences between each other and old Q15-I-6x design and what can be agreed.

2.3 Compression performance

[VCEG-M08](#) Comparison between TML-5.2 and H.263+ (UBC code) Annexes F, I, J, and, T, Common cond. VCEG-L38, 2 methods for evaluation (For Inter-frame coding DSNR gains between 1.34 - 3.2 dB, bit-rate savings between 11 - 58 % with average of 37% @ 32 dB, for Intra-frame coding lower gains), Comments on subjective gains: higher subjective gains than bit-rate reduction would suggest

[VCEG-M33](#) Calculation of average PSNR differences between RD-curves. Interpolation curve with 4 coeffs is fit. Denominator coefficient may cause singular point for some cases. Logarithmic scale puts more weight on lower bit-rates and $10\log_{10}(\text{bit-rate})$ should be displayed. With log-bit-rate, 3rd order polynomial is used. DSNR and average bit-rate reduction values are required in addition to RD-curves for each proposal. Gisle will provide support for that in the common conditions document [VCEG-M75].

[VCEG-M34](#) Contains results from various other documents – revisit in the presentation of each.

2.4 Complexity

[VCEG-M06](#) Covered previously in ad-hoc report section

[VCEG-M23](#) Profiler run: search range corresponds to complexity increase, search range corresponds to different performance for various sequences, almost no gains were reported for CIF sequences. Run-time also varies with QP or λ . Half-pel and Quarter-pel search together require a similar complexity than integer-pel search. A RD optimization of the TML was suggested.

[VCEG-M50](#) Optimized C implementation presented. 733 Pentium III, 256 Mbyte RAM. Fast motion search with triangular inequality without performance loss. Other lossy method provides even more gains. Take actual numbers from document. More than half of coder complexity goes into MC. Two times complexity of decoder as limit. Decoder complexity governed by deblocking filter and sub-pixel.

2.5 Header issues

[VCEG-M61](#) Random Access issues. Concerns raised about H.263 method for picture size indication. Use Custom picture format only. Provide sequence or GOP headers. UVLC for #MBs hor & ver. No limits. Fit in pics which are not multiple of MBs. Side work.

[VCEG-M74](#) (not available yet, but presented in draft form) Sequence layer, Random Access Layer, Picture Layer, Slice layer ... complete as an input document containing the author's best ideas – adopt the minimum capability needed for our software to function properly as an output document

2.6 Data partitioning and NAL

[VCEG-M52](#) TML changes. Replace secs 7 & 8 of TML-6. Syntax matches TML-6.0 software. Syntax desc. language. Separate document for TML and H.26L. File format, H.223, ..., Structs for MBs and Slices defined. Various partitioning modes defined. NAL spec incl verbal desc, encapsulation, header spec. Included in TML-6.0. Decoder not done yet. Bugs from VCEG-M56 fixed. **Adopted.**

2.7 QP change indication

[VCEG-M31](#) DQUANT is conditioned on CBP. Signaling DQUANT uses arithmetic wrap. Overhead is 1%. **Adopted**. Request for larger QUANT values for higher pixel precision and limitation of inverse quantized values.

2.8 Entropy coding

2.8.1 Content-adaptive binary arithmetic coding

[VCEG-M54](#), [VCEG-M59](#), [VCEG-M60](#)

IPR info 2.1. Deutsche Telekom (List) indicates that his company may have IPR on this (probable 2.2 terms) and will investigate whether it applies. MQ coder could potentially be available.

Integrated in TML6, verified by TUM in VCEG-M54, now includes support of slices, data partitioning, B pictures, ...

binarization similar to current UVLC, resync at picture or slice level, external contexts only at higher syntax levels (not for coefficients).

large relative gains for B pictures, overall gains for I/P/B sequence up to 44% at low bit rates

Overall on test set average 8-12% gain (as low as 3.5% as high as 27%)

Estimated complexity increase 0-2% encode or 0-20% decode, can be reduced by using MQ coder

Further work (e.g., inclusion in encoder decisions, adding context modeling to some aspects) could provide more benefit.

Is the decoding complexity a problem?

Shannon-Fano codes, Shannon-Fano Huffman codes?

Error resilience implication – what if reset each slice?

Can we make it an annex/alternative profile?

Remark from group: Towards high QP, it seems to be macroblock skipping that gives much of the gain.

Keep as optional feature in software? No optional features are to exist in the profiles, this goes in a profile, but we don't want the concept of optional modes. Adopt as something available to be used in the definition of a profile to be determined. Officially **adopted in** and under source code control.

Revisit at subsequent meeting.

2.8.2 MTYPE adaptive syntax and identification of coded MBs

[VCEG-M14](#) Looked at macroblock type information (skip indication is a critical part), indicate “normal”, “high motion” (switch “skip” and “16x16”), and “low motion” (RLE for skip), choose in encoder based on previous picture, up to 23% savings at large QP (Akiyo, low motion), larger savings with increasing resolution and frame rate, maybe just use other proposal for coding skip indication [IPR 2.2]

[VCEG-M29](#) Performance for high QP, use run-length coding of MB skipping (use a run past end of picture if last MB skipped) [No IPR asserted] up to 36% gain (Akiyo), esp. low motion, high QP. Some minor loss of efficiency in isolated cases. Ought to be a big improvement for B pictures. Note: H.261 and H.262 had something similar and H.263's dropping this appears to have been a mistake. **(Note: MB type table error in current TML – correct)**

[VCEG-M57](#) Syntactically identical to VCEG-M29, also gives gain for high motion [IPR 2.2 (general policy issue)]

Summarize three proposals:

Element 1: skip coding **adopted** [[VCEG-M29](#)]. This also applies to B-frames, where the skip indicates direct-skip.

Direct-skip M29

Direct-coded CBP-DIRECT is transmitted with CBP-1

FW/BW/BD-skip, FW/BW/BD-coded use CBP as usually

Element 2: adaptive (3 modes of operation: a) run-length skip, b) skip as second-shortest codeword, c) skip as fourth-shortest codeword) MB type table (3-4% foreman QP=28, mobile similar, other 1-4% QP in (16...28)). Wait and encourage further work.

2.8.3 Adaptive VLC and scanning

general conclusion on these three is that gain appears limited, would like to see a more consistent logic to the structure of the coding algorithm, there doesn't seem to be support for adopting these at this time

2.8.3.1 Intra coding VLC and scan order

[VCEG-M51](#) Choice of scan order dependent on prediction type, same VLCs as [IPR statement? 2.2 to add], 2-10% gain (0.5-1.0 dB at high rate, not much at low rate) ... perhaps revisit as a high bit rate profile...used common conditions

2.8.3.2 VLC concatenation for Intra and CBP

[VCEG-M58](#) roughly same idea presented at last meeting, full results and integration now, performance on more than just the first picture, same VLC as in VCEG-M51 a bit less gain (just one scan order, only used for double scan, not really much of a complexity impact) than VCEG-M51 for intra, performance 2-3% improved, performance up to 13-14% on CBP, overall performance a little less than 1% gain, some losses in performance experienced at low bit rate, IPR statement 2.2 provided, group comments: perhaps more gain with a different and more general method, why stick to fixed-to-variable coding? (e.g., use Tunstall, dual tree, etc.) – continue to look for more universal an adaptive coding methods...used common conditions

2.8.3.3 Adaptive double scan

[VCEG-M69](#) add alternative double scan transposed from current double scan method for intra, alternative one used depending on prediction mode, little complexity and storage impact. 0.2%-1.8% bit rate savings [IPR statement 2.1 to be provided for baseline]. Can be combined with other ideas (reduces run lengths)... not using common conditions

2.9 Multihypothesis and B pictures

2.9.1 Direct mode prediction

[VCEG-M39](#) Encoding decision for residual coding for direct mode. Computation of threshold to detect motion between frames. Complexity reduction and RD-improvement.

P1

B

P2

Direct-skip	skip
Direct-skip	16x16
Direct	16x8, 8x16, 8x8, ...

Valuable Contrib. Further study recommended.

2.9.2 Multihypothesis motion

[VCEG-M40](#) Picture Reference on block level provides inferior gains. Two macroblock shapes are transmitted. Initialization is provided by single-hypothesis encoding. 1-2 iterations calling single-hypothesis motion estimation. PSNR gains 0-0.9dB, bit-rate reduction 0-13 % at high bit-rate end. Some subjective improvements are visible and show more gains than PSNR would suggest. Application to P pictures does not seem to justify the additional complexity associated with the demon gain. Further studies are encouraged.

Would like to see interim work on the optimization of the software and encoder. An AHG is established to work on this with Thomas Wiegand chairing it.

2.10 Motion representation

2.10.1 1/3-sample motion

[VCEG-M28](#) 6 tap filter for horizontal and vertical interp, diagonal positions generated by 2 separable 6 tap filters. 1/3-pel lowers complexity by Increases in bit-rate around 6 % with min of 2 % and max of 17 %. Small but visible difference between 1/3-pel and 1/4-pel.

4 Shapes: 16x16, 16x8, 8x16, 8x8: 4% increase

2 Shapes: 16x16, 8x8: 8% increase

MV over pic boundaries, 7 Shapes: -2.2 %, 4 Shapes: 0.32 %, 2 Shapes: 3.9 %

Comment was made on motion vector estimation procedure regarding the degree of rate-distortion optimization. It was pointed out that the group may decide to remove various block sizes after further studies have been conducted.

The feature motion vectors over picture boundaries is **adopted**. Stephan will do this as part of his effort to improve block.c etc.

2.10.2 1/8-sample motion

[VCEG-M45](#) Similar to Eibsee. Direct interpolation used leaving decoder complexity constant. Motion estimation is conducted via successive sub-pel refinement. 3 cases compared: 1: TML-6, 2: 1/8-pel 6-tap, 3: 1/8-pel 8-tap. On Mobile & Calendar, significant gains were shown. The gains were smaller on Flower Garden but visible. No gains on other sequences. **Adopted** as a tool for higher complexity / higher coding efficiency (hopefully) yet to be defined profile (1/8-pel + 8-tap).

2.10.3 Motion resolution and complexity

[VCEG-M46](#) Comp Compl: Multiplications/Add scale with filter taps and resolution

Encoder: big increase for up-sampling complete picture

Decoder: doubling of computation for 8-tap and 66 % increase for 6-tap

2.10.4 Interpolation

[VCEG-M35](#) Method introduced for interpolation significantly reducing complexity at the cost of 2-3 % bit-rate increase.

2.10.5 Direct interpolation

[VCEG-M44](#) Rounding issues of interpolation scheme. Rounding steps incur mismatch. Double sampling rate picture needs higher precision (20 bits). Encoder could duplicate decoder filtering after decision has been made.

2.10.6 Block sizes and complexity

[VCEG-M47](#) Prediction beyond picture edges: extension of memory. Not much increase in comp complexity.

Multiple block sizes: integer and sub-pel search equally share computational complexity. 1/3 pel would reduce complexity by 25 % and removal of 4x4, 4x8, 8x4 provides 37 % reduction in complexity.

An AHG is established to study the relationship between motion accuracy/filter-tap number and profiles/levels as well as the direct versus subsequent filtering issue being chaired by Gary Sullivan (GS,MH,TW,KL).

2.11 Transform

2.11.1 Complexity reduction

The group has an interest in having a simple transform (e.g. lower wordlength) and possibly in an invertible transform, but feels that the proposals could potentially benefit from further investigation. So further work is encouraged and neither modified method is adopted at this time.

[VCEG-M16](#) modified transform, no multiplies (bit shifts, adds, subtracts), 16 bits sufficient (actually only 13 bits needed (with 9-bit input, 2 bit increase in each dimension), implementation done in 5.2, essentially the same performance, IPR 2.2 (in r1 of document), complexity lower on most architectures (although perhaps not much on a Pentium), invertible (inverse transform is exactly the inverse of the forward transform – a property not exactly shared by the current H.26L transform), based on LU decomposition of DCT with scaling (scaling can be absorbed into quantization/inverse quantization stage with a *specific scale factor for each coefficient*) using “lifting” technique, same theoretical coding gain (0.95 correlation) as DCT, 10 adds and 5 shifts for a 4x1 transform (instead of 6 multiplies and 8 adds for DCT), various forms possible, approximately orthogonal and approximately linear (but not exactly either), can extend the idea to 8x8, 16x16, plan to work on reduced complexity quantization, ... remark that transform is not a large percentage of the processing time in encoder or decoder, question whether invertibility really needed. No subjective impact asserted.

[VCEG-M71](#) two variations of transform: all 16 bit and 16 bit with 32 bit intermediate results, less multiplies and adds if parallel operations, slightly more if no parallelization, some loss (0.5 dB) in performance at high bit rates with the all-16 bit variation (don't know exactly why). No subjective impact asserted for 16-bit input version.

2.11.2 Adaptive block transforms

[VCEG-M62](#) (method), [VCEG-M63](#) (CE results)

Connect the block size used for transform to the block size used for motion compensation, same transforms as at last meeting (8x8 from

Portland), adjustment of CBP codes for use with ABT, deblocking filter adjusted for ABT, 3-D VLC may be advisable for 8x8 and larger transforms (not really any significant difference in SNR performance (~1%), but structure of entropy coder seems better if 3-D, no R-D optimization of quantization at the moment, SNR performance about neutral overall (sometimes a little gain ~0.3 dB on Paris, sometimes a loss ~0.5 dB on container), IPR appears to be 2.1

Comment: complexity study may lead to reduction in number of block sizes for motion comp (note that there may be subjective gain to support of small block sizes).

ABT may not be appropriate for baseline due to need for support of multiple transforms

What if just use 4x4 and 8x8 but not larger transforms? Works pretty well but get some gain from using larger transforms.

Combination with CABAC may yield to an improvement in results.

Subjective performance: A small but visible difference with significant decrease in "popping" artifacts and significant increase in ringing artifacts (Paris and Container Ship sequences).

Proponent indicates that performance might improve with further work (e.g., CABAC integration).

There is interest in this technique, but the demonstrated form of the proposal did not appear to show adequate benefit. Further work may produce better results.

[VCEG-M68](#) (entropy coding investigation) Some changes to entropy coding relative to method used in VCEG-M62, 63 to reduce the complexity of the entropy coding (perhaps some loss in perf, but not much), potential start code emulation problem

2.12 Pre & post & loop filtering

Complexity reduction of filtering process is definitely a strong goal, but not our top near-term priority. We seek harmonization of the ideas in these proposals toward a mature conclusion to reach at the next meeting. Form AHG (chair: Peter List) to investigate and try to harmonize and also seek best quality achievement along with complexity reduction.

[VCEG-M20](#) loop filter with skip mode, if two adjacent blocks are from the same reference and have the same motion vector value and no significant difference between residual values (based on DC coefficient being equal), then there should not filter across the block boundary, 28-47% savings in number of calls to loop filter function (although some of these calls may not do much), with essentially no SNR or visual impact, IPR 2.2 – as general policy.

comment: in some pathological cases, a bad artifact could result (although not expected to be frequent).

subjective: no visible significant difference in quality

[VCEG-M21](#) trying to reduce complexity of filter, evaluation of techniques mentioned by Gisle et al in last meeting, average 24% complexity reduction (direct computation of values simple optimization of software operation, etc), essentially same SNR, IPR 2.2 – as general policy

subjective: TML seems to have stronger filtering, simplified filter looks a little sharper.

[VCEG-M30](#) simplification of filter, simplification of strength function, modification of clipping function, direct computation, keep within 16 bits for computations, amount of simplification not really known, currently filter edges of blocks within a 16x16 macroblock, no IPR

subjective: which is generally smoother or sharper or better seems to depend on the sequence

[VCEG-M48](#) would like filter to operate on a macroblock basis with causal operation rather than on frame basis, if defined slightly differently, would operate on MB basis, no IPR.

comment: may want to change some other aspect if going to operate on MB basis

[VCEG-M22](#) trying to improve visual quality of filter, some increase in complexity relative to VCEG-M21 due to introduction of more filtering, 14% below complexity of TML 5.9 (0.06 to 0.16 dB improvement in objective quality).

subjective: smoother with proposed filter, not always better but usually

[VCEG-M43](#) Informational, need to reduce loop filter complexity for mobile service. Recommend that baseline not include current loop filter, possibly multiple loop filter definition (with post-filter encouraged) or no loop filter. Support VCEG-M64 concept.

[VCEG-M64](#) Information, comparison of in-loop and out-of-loop operation of filter, with minimal modification tested out of loop, no gain reported for use of loop filter for some sequences. Think about this in regard to complexity. Hall monitor is the only sequence with a particularly large objective performance improvement from in-loop filtering.

Comment: same test done by another, Foreman shows clear visual difference in favor of loop filter.

Comment: More complex outside the loop than in the loop.

2.13 SP frames [VCEG-M38](#), [VCEG-M73](#)

Perform transform, quantization and inverse quantization in the decoder, result in drift-free switching between two streams for a variety of functionalities, coding efficiency of using SP much better than using an I picture.

Coding efficiency improved since last proposal by using a different quantization step sizes in SP picture transition.

Compared to S frames (an alternative method), need fine quantization for switching, some unpredictable mismatch and drift results with significant quality impact, more drift with more switching, much larger bit rate needed at switch and don't get a quality benefit for all those bits.

Comment: Note that current intra spatial predictive coding propagates mismatch and should be corrected to be better able to stop error propagation. This hurts the S frame anchor comparison.

Comment: Need a good anchor for comparison – are the I frames and S frames as used in this proposal sufficiently good anchors?

Almost the same efficiency as P frames if use M73 with smaller SP QP values more loss at low bit rates, on the order of 5-10%

Subjective quality with periodic SP frames relative to single stream P frames?
Some extra blocking and popping artifacts on Container ship (QCIF, 10 fps,

QP=20) with SP frames 1/sec, no significant quality difference seen on News (QCIF, 10 fps, QP=19). Approx 5-10% higher bit rate with the SP frames.

Probably not baseline due to added complexity of decoder – probably a streaming profile instead.

IPR 2.2

Adopt as a tool available for inclusion in some non-baseline profile(s) yet to be determined. Primary proposed profile is streaming. Need to define test conditions for candidate profile(s). Integration into software and document is not a primary near-term priority.

2.14 Scalable bitstream [VCEG-M17](#)

Information document, advocacy for investigation of scalability, particularly for pre-encoded content with fine granularity over a relatively small (e.g., base layer + 50% bit rate), reference to MPEG M7016 proposed requirements and M7122 P-FGS techniques.

Some questions were raised about practicality of assumptions of network awareness of prioritization of data, awareness and timeliness of awareness of channel rate availability.

2.15 Encoding techniques

2.15.1 Fast motion estimation

[VCEG-M19](#) Some reference frames are more likely, search only a subset of the reference pictures depending on frame used by neighbor macroblocks. Degradation 0.0 – 0.2 dB with 50% savings in computation time. Support of idea in spirit, but not as an immediate top priority.

[VCEG-M26](#) fast motion estimation using projections and triangle inequality.

The group would welcome a contribution to our software to make it run faster without any sacrifice in quality, and in the longer term perhaps with a very small sacrifice in quality. At the moment we want no sacrifice in quality. Rate constraint needs to be incorporated. The need for such a tool is agreed in spirit. Adoption of a speed-up that sacrifices quality seems a longer-term need but not an immediate top priority.

2.15.2 Dropping isolated chroma AC coefficients [VCEG-M32](#)

No IPR asserted (also an encoding issue only)

subjective: Mobile and Calendar sequence – no signif diff at same QP with differing rate, visually better when approx same bit rate (4% higher for proposal)

adopted

2.15.3 Quantization [VCEG-M72](#)

RD quantization appears to have less than 0.1 dB benefit overall

Does help on intra pictures (e.g., 0.2 dB)

Note: impact from intra picture being more coarsely quantized by RD quant hurts overall sequence perf due to carry-over of quality from I picture.

Should not be considered part of real-time operation.

decision: **drop** the RD quant feature from the test model.

- 3.0 H.263 maintenance
 - 3.1 General status of work [VCEG-M36](#)
Seek a little further contribution in regard to Annex U and V for test model appendix.
 - 3.2 H.242 and H.263 annex X [VCEG-M15](#) see 1.8.2 above
 - 3.3 Implementers guide [VCEG-M37](#)
 - 3.4 Test model reference encoding design
- 4.0 Closing review and results
 - 4.1 Presentation and review of results of meeting sessions
Output documents:
 - 75 CC Coding Efficiency will be produced
 - 76 CC RTP packet will be produced
 - 77 CC Mobile packet reviewed, more to be done
 - withdrawn CC Mobile circuit used Q15-I-60
 - 79 Header Design (longer term work also required, short term changes may be possible also if problems are found)
 - 80 LS to MPEG re DCinema and Video Compression Tests reviewed
 - 81 TML 7 document
 - 4.2 Liaison statements and collaborative letters to be written
80 LS to MPEG re DCinema and Video Compression Tests reviewed
 - 4.3 Plans for future work, and ad hoc committees
AHG Test model and simulation (Wenger) incl. finding new test sequences
AHG H.26L development (Sullivan)
AHG H.26L complexity (Horowitz)
AHG H.26L profiles and applications (Wiegand)
AHG H.26L loop filtering (chair: Peter List) to investigate and try to harmonize and also seek best quality achievement along with complexity reduction. AHG (chair: Peter List) to investigate and try to harmonize and also seek best quality achievement along with complexity reduction. (PL,GB,JL,LK, proponents)
AHG on Motion Rendition (relationship between motion accuracy/filter-tap number and profiles/levels as well as the direct versus subsequent filtering issue being chaired by Gary Sullivan) (GS,MH,TW,TW2,KL).
 - 4.4 Future meeting plans
See section 1. Try to arrange joint/co-located meetings with systems questions.
 - 4.5 The group thanked Polycom, the host organization, and particularly Michael Horowitz for their support and excellent arrangements for the meeting, and also Preferred Meetings, Inc. and particularly Caitlin R. Carroll for their logistical aid.
 - 4.6 The meeting was closed at 9:00pm on Wednesday, April 4, 2001.