

Bericht aus MPEG

68th MPEG Meeting, Munich

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MPEG-4 Visual

- 14496-2:2004 COR 1 (**N6362 & N6361 DoC**)
 - Modifications based on Study of last meeting and input of US and Japanese NBs
- Updated 'List of Problems Reported' (**N6363**)
 - Only minor issues related to 14496-2
 - Detailed report on software bug fixing: Microsoft version of software is bug-free now
 - All conformance issues were moved to WD of corrigendum
- Edition 2 of 14496-7 (**N6365**) – ed. period 1 week
 - Optimised Reference Software

MPEG-4 Visual Conformance

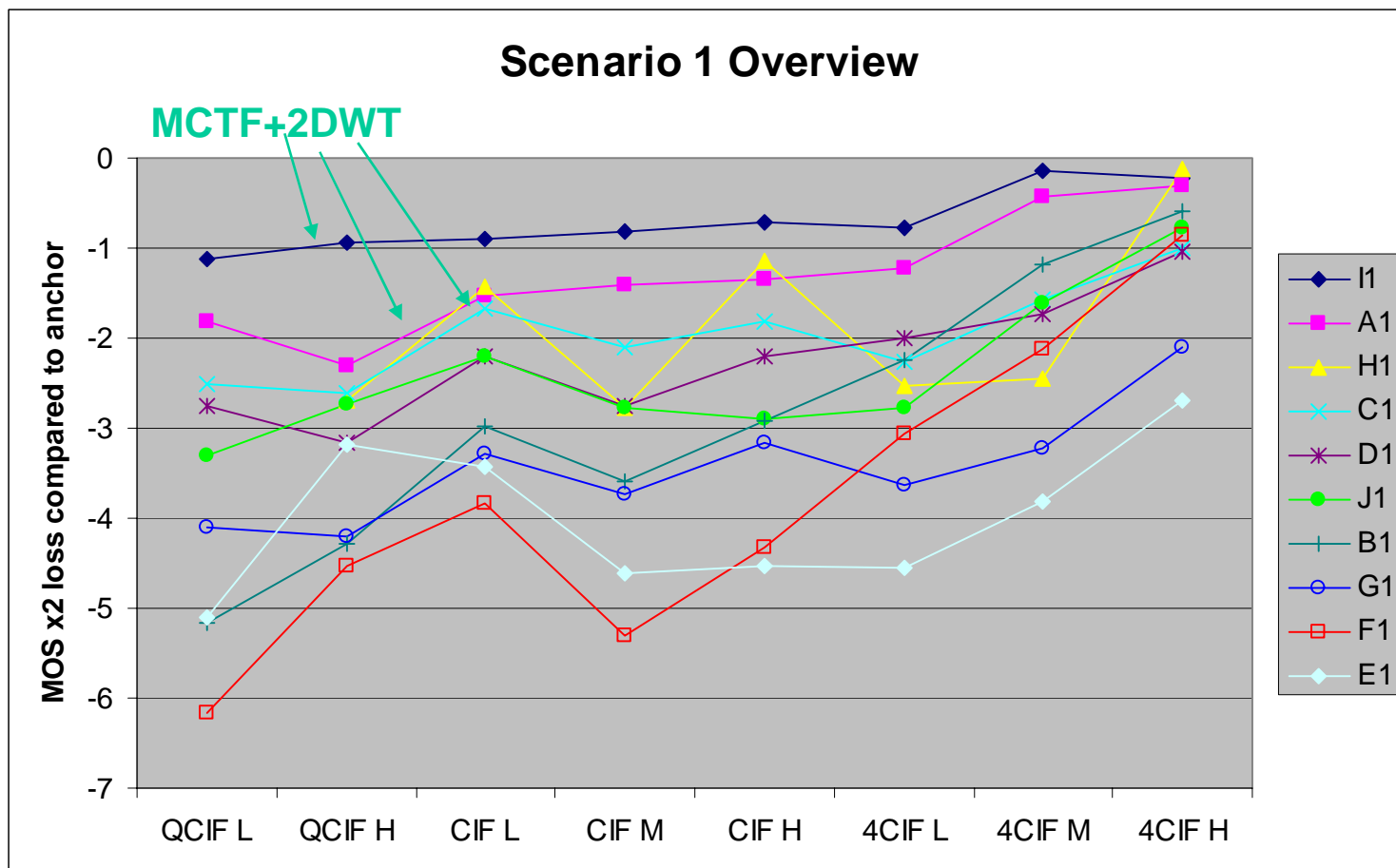
- WD of 14496-4 Visual Bitstreams Conformance Corrigendum (**N6364**) – ed. period 4 weeks
 - Corrected bitstreams received from 3 companies
 - Plan to collect further bitstreams from list of missing or erroneous bitstreams
 - Correction of mismatches between text and bitstream names
- The following procedure is planned
 - All bitstreams to be collected on NIST CVS
 - DCOR will be issued **October 2004**
 - All bitstreams that are not received until then will be **removed from conformance part (14496-4)**
 - This implies a follow-up action where the related profiles and levels are **removed from the standard (14496-2)**

21000-13 Scalable Video Coding CfP

- Technical analysis done of the different proposals received
 - 14 **full proposals**
 - 7 **tools proposals**
 - 5 **technical inputs**
- Contributing companies and organizations
 - DEI-PdM, ETRI, Fraunhofer-HHI, GET-ENST, IRISA/INRIA, Kyung Hee University, Michigan State University, MSRA Asia IM group, MS CMPT group, NCTU, NEC Corporation, Nokia, OES/ITRI, Poznań University of Technology, QMW, Quix Technologies, RPI, RWTH Aachen, Samsung Electronics, Thomson R&D, TILAB, Visiowave, VUB, UC Davis

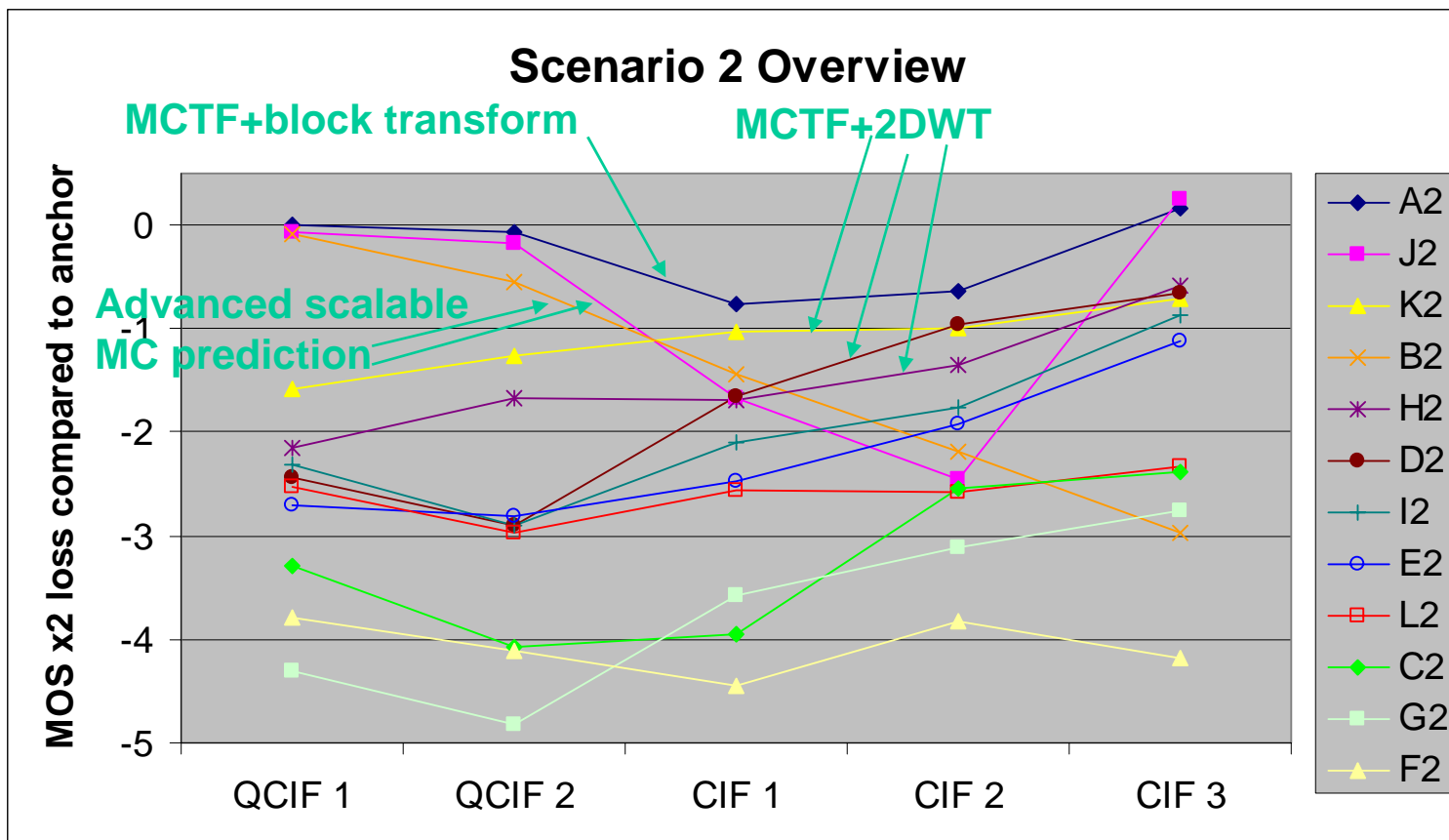
Call for Proposals – Results

- Scenario 1: Scalability over 3 spatial layers



Call for Proposals – Results

- Scenario 2: Scalability over 2 spatial layers



21000-13 Scalable Video Coding CfP

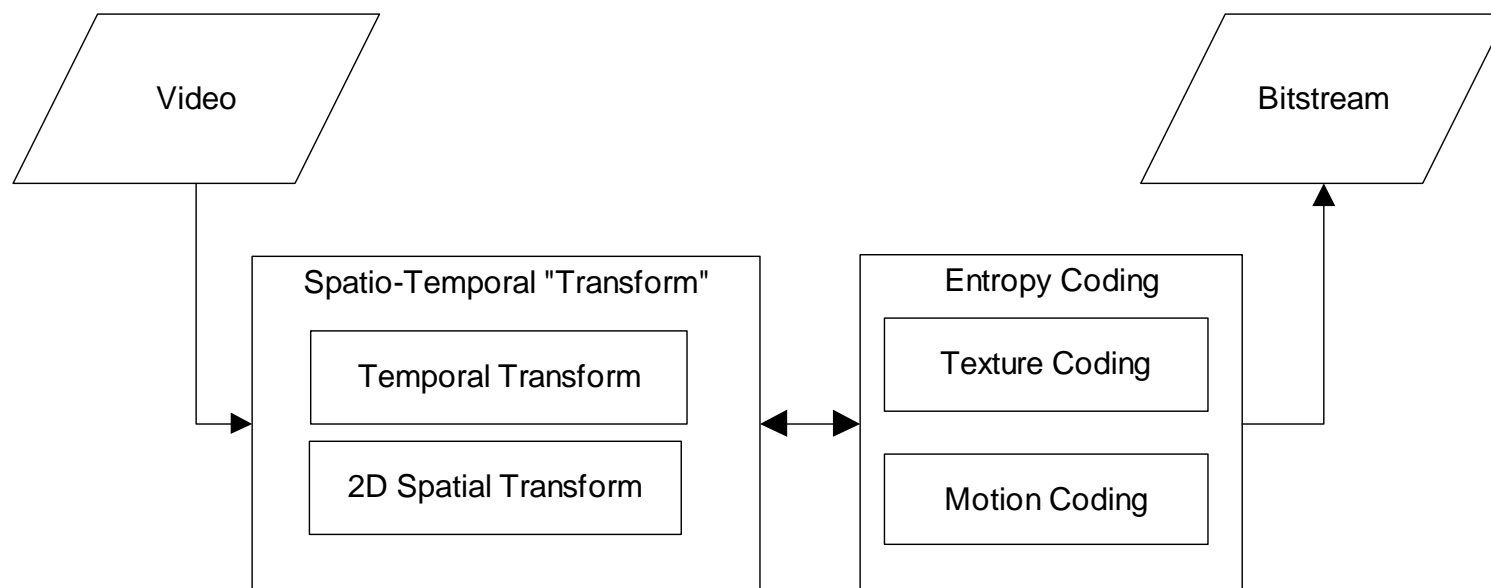
- Analysis of test results:
 - Scalable coders **close to anchors**
 - Best proposals <0.5 MOS average
 - Better than single layer at some rate points
 - Depending on technology, the **best operating range is rate dependent**
- Exact weighting in trade-off with specific requirements (e.g. low delay) difficult
 - requires a more detailed analysis of different operating modes, which can only be done in Core Experiments
 - More background is necessary on detailed requirements of application cases

21000-13 Scalable Video Coding CfP

- Grouping by 2 categories of proposals
 - **Category 1: MCTF/2D Wavelet**
 - Best performance in Test 1 (more wide range of scalability)
 - **Category 2: AVC based (incl. AVC/MCTF)**
 - Best performance in Test 2 (less wide range of scalability)
- Capability of multiple adaptations was regarded important to judge results
- Results show evidence that technology exists
 - which can be used as starting point of SVC
 - but is expected to further improve

Scalable Video Model (SVM)

- **Motion-compensated temporal filtering (MCTF)** is common basis of many proposals
- Other elements tested around this common basis in Core Experiments



SVC – Core Experiments

- Core experiments designed for **optimization and convergence** of different proposals within the categories
 - Starting point are the best performing in each category
 - Core Experiments will be based on **two software implementations** (one per category)
- Result of Core Experiments will be used for decision to adopt **one complete codec** architecture into the WD

SVC – Core Experiments

- CE conditions derived from CfP
 - Test 1 (**3 layers** of spatial scalability), but reduced to only 6 different rate points
 - Test 2 (**2 layers** of spatial scalability) unchanged
- Methodology is defined jointly with the test group to evaluate selected CE results by **expert viewing** tests in future meetings
- In addition, a methodology is explored which would allow to use **objective criteria** based on PSNR (at least for optimization of single tools)

SVC – Core Experiments

- **CE 1 (MCTF+2DWT =category 1)**
 - 1a: Scalable Motion Information
 - 1b: Spatial Transform & Entropy Coding
 - 1c: Intra Modes
 - 1d: Introduction of a base layer
 - 1e: MCTF with de-blocking
- Total of 28 participating companies and organizations (if my counting was correct)
- All experiments based on software that will be provided by Microsoft Research Asia
 - Indication that software could be made available to all MPEG members (approval pending)

SVC – Core Experiments

- **CE 2 (AVC based/extended =category 2)**
 - 2a: Combination of MCTF and MC Prediction
 - 2b: Inter-layer prediction modes and upsampling
 - 2c: Comparison of SNR scalability technologies
 - 2d: Dynamic spatial transforms
- Total of 18 participating companies and organizations (if my counting was correct)
- All experiments based on software that will be provided by Fraunhofer – HHI
 - Will be made available to CE participants only

SVC – Output Documents

- Subjective test results from the CfP on Scalable Video Coding Technology (**N6383**)
 - Thanks to Tobias and Vittorio for their great work in performing the tests and help in evaluation of results
- Scalable Video Model Version 1.0 (**N6372**)
- Description of Core Experiments in Scalable Video Coding (**N6373**)

SVC – Joint Meetings

- With Systems on Layered Video Coding
 - Proposal for 2-layer scalability with existing standards base/enhancement layers
 - This would fully be accommodated by the SVM framework (and is a simple case of it)
 - Technically feasible
 - No clear evidence about urgent market needs

SVC – Joint Meetings

- With JVT on SVC
 - SVC proposals from **category 1** have used some tools from AVC
 - SVC proposals from **category 2** are extensions from AVC
 - Single-layer **AVC** could be very important as **base layer** in SVC applications, which seems possible in both categories
 - **MCTF framework** seems to be highly interesting for both groups
 - We need to make best use of existing technology and avoid divergence of standards

Exploration on 3D AV Coding

- Call for Comments
 - 23 responses received and analysed in detail
 - Strong support and industry demand for Free Viewpoint Video
 - as described in Apps&Reqs doc
 - some more concrete examples given
 - Some requests to start more concrete standardization effort
- Contributing companies and organizations
 - 3D Consortium, Cukyo TV, ETRI, Fraunhofer HHI, Hanyang University, Hitachi, KDDI, Matsushita, Mitsubishi Electric Corporation, Mitsubishi Electric Research Laboratory, NEC, NHK, NTT, NTT Docomo, Sanyo, Sharp, Sky, Sony, STMicroelectronics, Toshiba, TU Ilmenau

Exploration on 3D AV Coding

- Relevant application scenarios identified which could be used for technology evaluation in a CfP
- 3D TV
 - Cameras in an array (e.g. 2x8)
 - View adaptation by user interaction or presentation on multiview displays
 - Problem is efficient compression as compared to simulcast
- Interactive view selection
 - Cameras distributed around a moving object
- In both cases, the main issue related to video is efficiency of multiview video representation

Exploration on 3D AV Coding

- Many functionalities of 3DAV can be achieved using existing standards tools by proper combination
 - This will further be studied with potential to define a Multimedia Application Format, following the requirements of Omnidirectional Video
- Results are not conclusive yet about the maturity of 3DAV technology that might require new tools standardization
 - Partially due to the fact that test material that was used before this meeting did not cover sufficient realistic cases
 - Draft Call for Evidence **N6374** (MPEG internal with responses in July) for further clarification of maturity and testing conditions

3D AV Call for Evidence

- Only compression performance of multiview data representations can be evaluated at the moment
 - Rendering process must be excluded, as this might bias the results
- Technical proposals for exploitation of interframe/inter-view redundancies will be compared against simulcast
 - Anchors are encoded by AVC
 - Multiview sequences (up to 16 cameras) with different settings (baseline distances, convergence angles ..)
 - To be compared by PSNR gain and subjective quality

Exploration on VCTR

- VCTR=Video Coding Tools Repository
- Background:
 - Landscape of media coding usage has changed a lot for the last two decades
 - One tool=One functionality rule may not always apply
 - MPEG Video Standards are in competition with non-MPEG standards
 - Similar building blocks are used over different standards
 - Building blocks from different standards could be combined

Exploration on VCTR

- Definition of the repository:
 - Collection of decoding **functional units** extracted from existing MPEG standards and updated with new tools whose addition has been considered beneficial by MPEG
 - The collection materializes in textual description of different **functional units**, reference software (and possibly hardware description), and conformance testing tools

Exploration on VCTR

- How can the repository be used?
 - add new **functional units** or extend the functionalities of the existing **functional units** to create new profiles of existing standards or new standards
 - create combinations of old/new **functional units**
 - implementers can integrate multiple decoders
 - upgrade video decoding capabilities
 - create multimedia middleware components

Exploration on VCTR

- Definition of a **functional unit**
 - Not the same as **tool** from existing standard
 - In most cases probably more granular
 - Definition of **glue** elements may be needed to fit different functional units together
 - Study of typical functional units was started (e.g. DCT/IDCT, MC, DC/AC prediction)
 - Even at this level, divergent definitions in different standards can be found
- Much more detail can be found in Study of Video Coding Tools Repository (**N6375**)

Intra-only Video Coding

- Could be an interesting example of VCTR usage
 - Interest from industry was shown to combine intra tools from all MPEG standards
 - No complicated inter-relationships with prediction loop, intra coding tools can easily be isolated
- Technical feasibility shall further be studied within the work of the VCTR AHG

AHG's established by Video

- AHG on Maintenance of MPEG-4 Visual related Documents, Reference Software and Conformance (N6376)
- AHG on Maintenance of MPEG-7 Visual related Documents and Reference Software (N6377)
- AHG on Description Tools for New Visual Extensions (N6378)
- AHG on Core Experiments in Scalable Video Coding (N6379)
- AHG on 3D AV Coding (N6380)
- AHG on Video Coding Tools Repository (N6381)