International Telecommunication Union

Session 7: Wrap-Up
Conclusions & Suggestions

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ITU-T VICA Workshop
22-23 July 2005, ITU Headquarter, Geneva

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Session chair notes

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Session 1 – Network Platforms

Session 1 – Network Platforms

- Opportunities for the transport of video and image
  - Convergence of telephone including multimedia communications, digital audiovisual including broadcasting, Internet access, tele-control (HN)
  - Higher bandwidth and controlled QoS (NGN)
- Limitations to the transport of video and image
  - Need for accommodating more channels, use of MPEG-2 transport (cable)
  - Terminal price, size, complexity, packet erasure (mobile)
  - Share the network nature (Internet)

Session 1 – Network Platforms

- More compression is yet to be sought
- Adaptation to mobile networks as well as its terminals and the Internet is to be further explored
- New generation video coding is to be standardized in a few years time, but not now
- Reconsider backward compatibility where appropriate

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Session 2 - Applications

Session 2 - Applications

- A new generation of video coding based on H.264/AVC is sweeping the world
- Standards stability is very important
  - Esp. for long-term archival storage
- Video apps need platform flexibility, error robustness, high compression
- Tamper resistance, selectable ROI very useful in surveillance applications

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Session 3 – Digital Video

Session 3 – Digital Video

- The new generation of advanced video coding designs (e.g., H.264/AVC, VC-1, AVS) can provide very substantial improvements in capability relative to the prior generations (e.g., H.262/MPEG-2, H.263, MPEG-4pt2)
- A diversity of such new video codec designs are appearing as candidates for use in applications
- Various trade-offs of compression capability, loss resilience, computational complexity, licensing terms, time-to-market, etc. can be found in recent video coding design efforts
- Design approaches include single-company design, open collaborative design, and IPR-guided open design
- H.264/MPEG-4 AVC has been extended to enhance professional and high-quality/high-resolution uses
- Future work will extend H.264/AVC to add “scalability” (with strong efforts to be more successful than past such work)

Session 3 – Digital Video

- H.264/AVC illustrates an open collaborative design approach conducted in major standards bodies
- VC-1 illustrates the single-company design approach with post-design standardization
- New approaches to IPR handling are being tried in AVS for design and intra-China licensing approaches, while “RAND” with post-design patent pooling is the usual approach
- IPR issues affect deployment adoption decisions by industry (and motivations of design participants)
- Better understanding, and perhaps new approaches, may be a key element of success for future coding technology

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Session 4 - Image Coding

Session 4 - Image Coding

- JPEG/JBIG is an excellent example of ISO/IEC and ITU-T cooperation
- Standards all have complex IPR
  - Effective handling is key to success (or failure)
- Recommendation 1: Take the IPR Policies and their implementation very seriously, introduce ITU-T/ISO "external" efforts for supporting this
  - (e.g. patent searching by Members and communication results to the committee, better links and information exchange between standardization and licensors, users)

Session 4 - Image Coding

- Generally, the still image work should be independent from communication protocol work
  - Might be exceptions
- Recommendation 2: It is for further study when those exceptions are justified
- Recommendation 3: Improved interaction, exchange of information and cooperation between codec standardization and protocol/application standardization is needed (for instance between JPEG and 3GPP)

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Session 5 - Performance measurements and assessments

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Highlights from Presentation 1 "Towards a standardised perceptual quality metric for multimedia " / David Hands

- Measurement of user experience is essential to the industry
- Traditional quality measures are inadequate
- Requirement is for objective perceptual metrics
- VQEG MM Validation Test for perceptual metrics
  - Goal is to evaluate objective metrics
  - FR, RR, NR models
  - 3 stages: video only, audio only, audio-video
  - Plan to be publish final report September 06

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Highlights from Presentation 2 "General purpose objective video quality measurement tools" / Steve Wolf

- Laboratory VQM Tool
  - Designed for Bench Top Evaluation
  - Source and Destination Video Signals / Files Available at One PC
  - UNIX (Batch) and PC (Interactive) Versions
- In-Service VQM (IVQM) Tool
  - End-to-End Measurements
  - Requires Two PCs (Source and Destination)
  - RR Features Communicated over Internet

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Highlights from Presentation 3 "State of the art of multimedia quality assessment methods" / Takanori Hayashi

- Multimedia quality assessment is at an advanced stage (subjective at least).
- Perceptual quality assessment methodologies for multimedia communications systems of the next generation are being discussed.
- Three important characteristics of upcoming services have been revealed by recent studies on multimedia quality evaluation models:
  - Multimodality, multiparty, and wideband.

Session 5 - Conclusions & Recommendations

- Measurement of user experience is essential to the industry
- Subjective methods are mature for television and fairly well along for multimedia
- Objective methods are needed and effective products have recently become available —primarily for standard definition television
- More work needs to be done for multimedia, HDTV, and to improve accuracy of Objective models — especially for error conditions
- Closer interaction with the coding experts in SG16 and ISO/IEC is recommended

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Session 6 – Future Trends in VICA

Session 6 - Future Trends in VICA

- New compression schemes are being investigated and would lead to next generation coding standards
- Next compression standards should bear in mind the characteristics and parameters of the future deployment environments
  - Network, Display, Capture, Complexity, …
- Need for compression in particular applications should be continuously reassessed
- The issue of perceptual quality metrics is fundamental in the improvement of current and future compression standards

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General workshop observations

Interoperability and Flexibility

- These are related!
- Standards should be flexible, not narrow
  - Support many applications; convergence
  - Work in many hardware environments
  - Avoid transcoding
  - Minimize number of interoperability points
  - Compression ratios – high to lossless
  - Graceful degradation, scalability
  - Error robustness
  - Tradeoff: Less optimization

Interoperability and Stability

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- Allow time for adoption & deployment
- Avoid fragmentation of standards cmtes
  - Regional standards, “turf wars”
- Fewer standards, less often
  - Larger jumps in performance
  - Archival storage – long term
  - Tradeoff: Less market responsiveness

Look Forward, not Backward

- Start from scratch ("clean-sheet")
  - Avoid complications from legacy support
- Architect – consider broader applicability
  - Consider other similar problems
  - Big picture, not a bit at a time
- Design – don't just imitate
  - Reconsider legacy features

Define Requirements Carefully

- Improve the requirements process
  - Focus on what industry will really adopt
  - Keep things simple – complexity = failure
- Source & Channel coding
  - Need a balance
  - Responsibility must land somewhere
- Semantics first – then transport
  - Consider if message really needed at all?

Performance Standards Needed

- For reference at least
  - Maybe requirements?
- Encoder quality measurement standards
- Perceptual quality measurement standards
- Perceptual models will be important
  - Avoid technology lock-in, specmanship
  - Clarify applicability/lack thereof

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dates

Video Coding

- Coding efficiency
  - Not clear that even H.264 is good enough
- Reduce computational complexity
  - Cost, battery, heat limits = poor quality
  - Simultaneous decoders
  - Encoder/decoder complexity tradeoff
- Enhanced tools for data integrity
- Tools to facilitate video event generation

Design for Real Networks

- Design for the environment of use
  - Tradeoff: Interoperability, transcoding
- Lots of bandwidth (sometimes)
  - Not so batteries, computes…
- Data integrity
  - Error detection, error resilience important
- Consider network transmission characteristics from start
  - Don't try to retro-fit later

Avoid Redundant Design

- Make use of infrastructure services
  - Don't re-invent at each layer
- Use tools as they were designed
  - Don't overload with unintended functions

IPR Licensing

- Complex patent licensing sometimes a major barrier
  - Cost is an issue
  - *Uncertainty is a bigger issue*
- Royalty-free, License-free
  - Desirable
  - Maybe difficult to achieve
- Reducing uncertainty would be useful!

Networks and Centralization

- NGN, 3G, 4G [WiFi?] networks are coming
- Where should the intelligence be?
  - Service providers – in the network
  - Equipment mfrs – in the endpoints
- Everybody wants to add value
- Need is to focus on real user values
  - Cost, performance, robustness..
  - Innovation, flexibility, creativity…

Summary

- Don't do it just because we always have
- Everything is a cost-benefit tradeoff
  - Market responsiveness vs. fragmentation
  - Backward compatibility vs. cost & performance
  - Timeliness vs. reliability
  - Consequences of failure?
    - Everything is a tradeoff
    - Perfection is impossible