Standardization activities for multimedia opinion model: G.OMV

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Objective, but subjective

o Fundamental aspect of audio and visual communication services is users' perceptions (i.e., subjective assessment).

o Subjective assessment is time-consuming and not applicable to in-service and real-time scenarios.

o Means for estimating subjective quality solely from objective characteristics is necessary (i.e., objective assessment)

o Various standards exist for various application scenarios.

Application scenarios (1/2)

o Quality planning

1. Objectives for individual quality factors (e.g., delay, echo, and packet loss)
2. Quality assignment to each element (e.g., network link, network node, and terminal)
3. Designing optimum balance of multiple quality factors (e.g., delay and packet loss)

o Quality benchmarking

1. Comparing different products in terms of speech quality under various conditions
2. Evaluating actual performance of service

Application scenarios (2/2)

o Quality monitoring

1. Confirming service being delivered as required (e.g., SLA)

2. Diagnosing a problem on a user-complaint basis (e.g., terminal/network, own/other network)

3. Macroscopic analysis of QoE/QoS for facility planning (e.g., enhancing link capacity of a specific route)

Map of current and future standards

ITU-T black: telephone-band, green: for wideband, purple: for cable TV, red for multimedia

Media	Estimated subjective quality	Use case		
		Benchmarking/ Intrusive monitoring	Non-intrusive monitoring	Network planning
Speech	One-way	P.862/P.862.1 P.862.2	P.563, P.VTQ	G.107 G.WBEM
	Two-way	P.CQO		
			P.561, P.562	
Audio	One-way	BS.1387-1		
Video	One-way	J.144 ?.XXX	?.YYY ?.ZZZ	
Speech/Audio and Video	One-way			
	Two-way	J.148		G.OMV (Videophone)

Framework of G.OMV (overview)
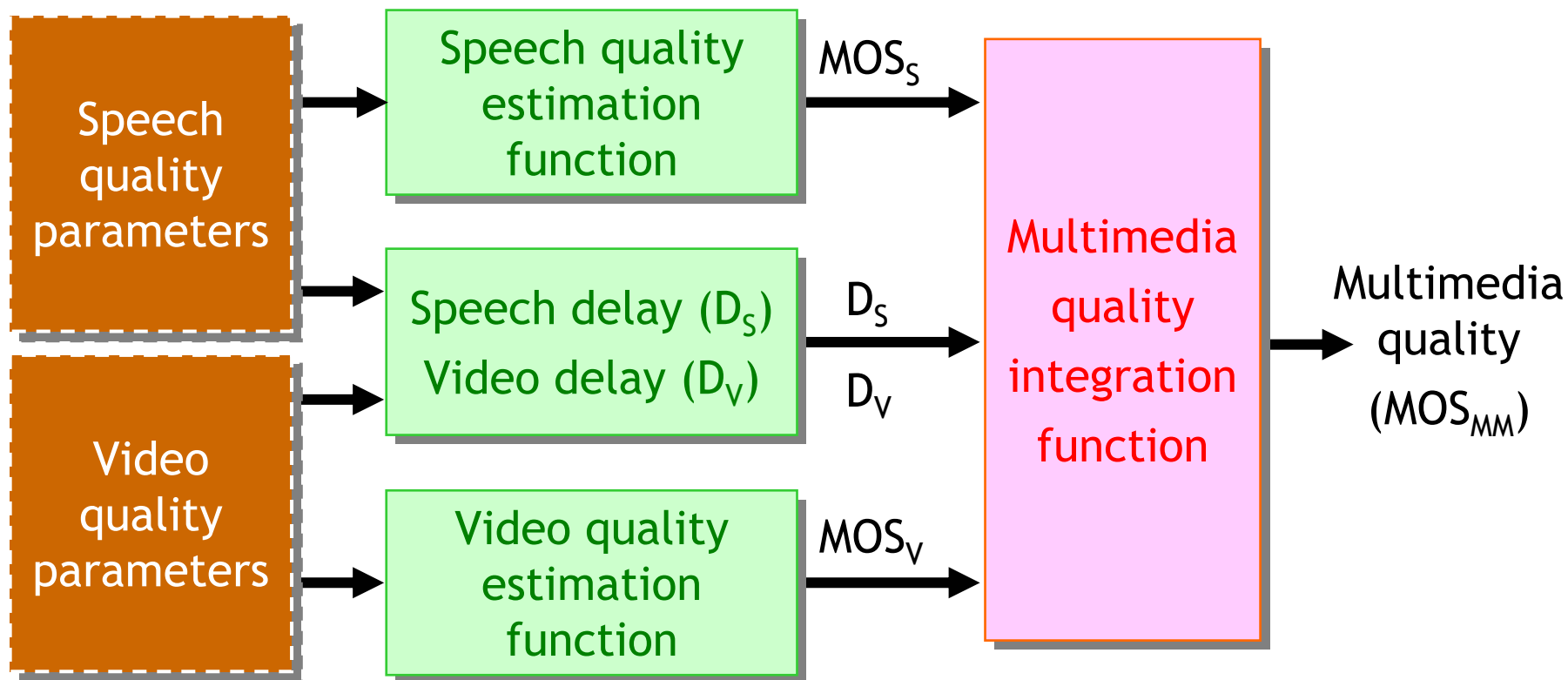
ITU-T

MOS: Mean opinion score

ITU-T

o   Assuming typical terminal characteristics

o   Input:

1. Speech and video codec
2. Speech and video packet loss rate
3. Speech and video delay
4. Talker echo loudness rating
5. Spatial resolution of video codec
6. Key-frame interval of video codec
7. Video frame rate

o   Output: MOS_S, MOS_V, MOS_{MM}

Framework of G.OMV (2/3)

o Individual speech and video quality estimation functions with predetermined coefficient databases for various kinds of codecs and coding conditions such as frame rate.
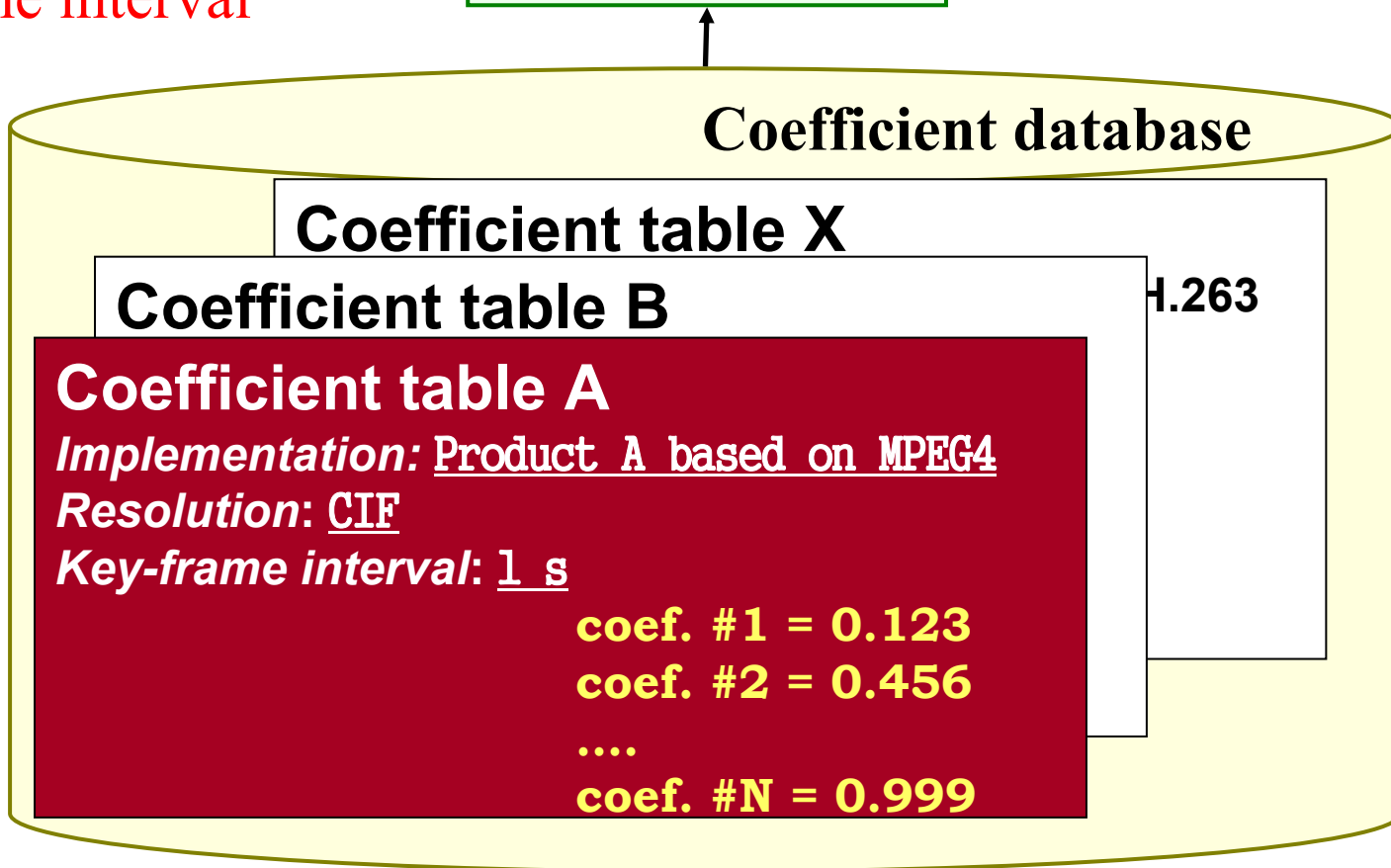
Determining audio and visual quality

Codec implementation
Spatial resolution
Key-frame interval

→ **Video quality estimation function** → **MOS$_V$**

Coefficient database

Coefficient table X

Coefficient table B

H.263

Coefficient table A
Implementation: Product A based on MPEG4
Resolution: CIF
Key-frame interval: 1 s
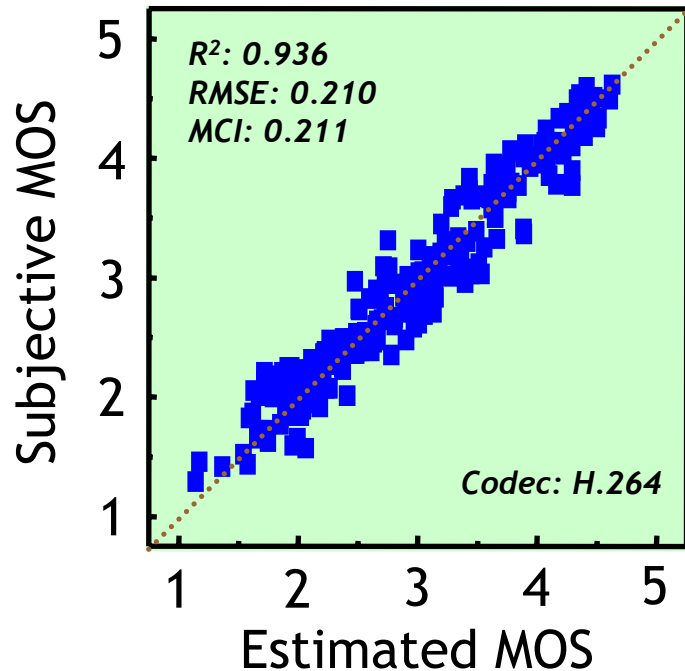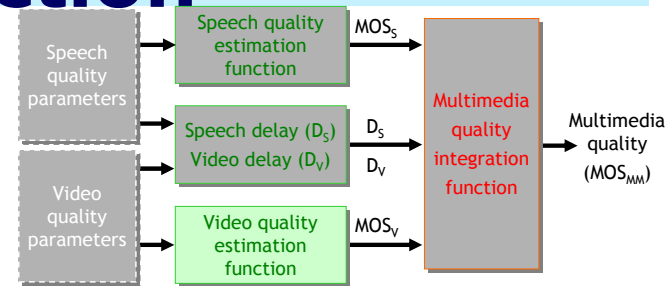
coef. #1 = 0.123
coef. #2 = 0.456
....
coef. #N = 0.999

Framework of G.OMV (3/3)

o   Multimedia quality integration function that takes into account

1.   interaction between speech and video quality,

2.   effect of delay, and
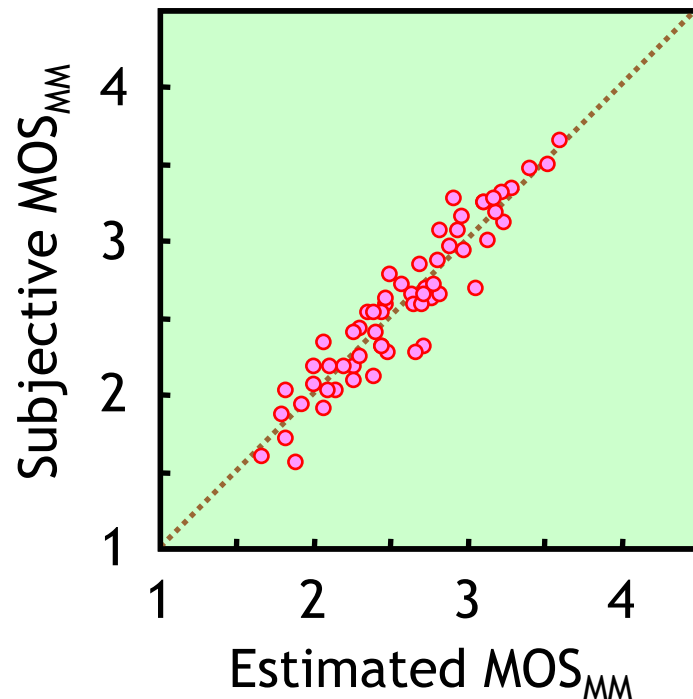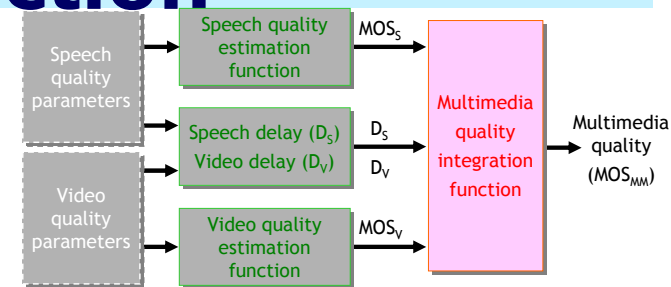
3.   effect of delay synchronization

Example of video quality estimation function

Experimental conditions

- Video codec: H.264 (Quicktime)
- Video format: QVGA
- Key frame interval: 1 s
- Coding bit rate: 64 – 1024 kbps
- Frame rate: 1 – 30 fps
- IP packet loss ratio: 0 - 10%
- Subjects: 32 non-experts

Example of multimedia quality integration function

Experimental conditions

- Speech codec: G.722 (64 kbps, mono)
- Video codec: MPEG-4 (4 Mbps, VGA, 30 fps)
- Network performance:
    IP packet loss ratio: 0~10%
    IP packet transmission delay: 167~1200 ms
- Task: Free conversation
- Subjects: 32 non-experts

Ref.: T. Hayashi, K. Yamagishi, and H. Yoshino, "Perceptual QoS Evaluation Model for Audiovisual Communication Services," World Telecommunications Congress 2006 (WTC'06), May 2006.

Future work

o Global consensus on framework of G.OMV

o Development of model (in collaborative way)

o Validation of model

o Development of procedure for deriving model parameters for new codecs (G.OMV Annex A)

o Provision of model parameters for typical codecs (G.OMV Appendix I)