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THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Enhancing your Music Curriculum – Connect to LIVE Musicians Using High Fidelity Videoconference

Presented by James Brennan (National Sales Director ANZ, Polycom) and Nathan Scott (Lecturer) Faculty of Education & Arts, University of Newcastle

Agenda

- Music Mode what it is
- Cross to Nathan Scott - University of Newcastle for a LIVE music lesson and discussion – music lessons using Polycom videoconference technology
- Questions

Challenges with Music over Videoconference

- Need for true acoustic representation
- Efficient and loss-less compression and decompression that preserves sound quality
- Lowest latency possible to enable a seamless and transparent virtual learning environment

Figure 1 - Pinchas Zukerman at Canada Art Centre Teaches a Student in

Manhattan School of Music

Early Challenges Continued

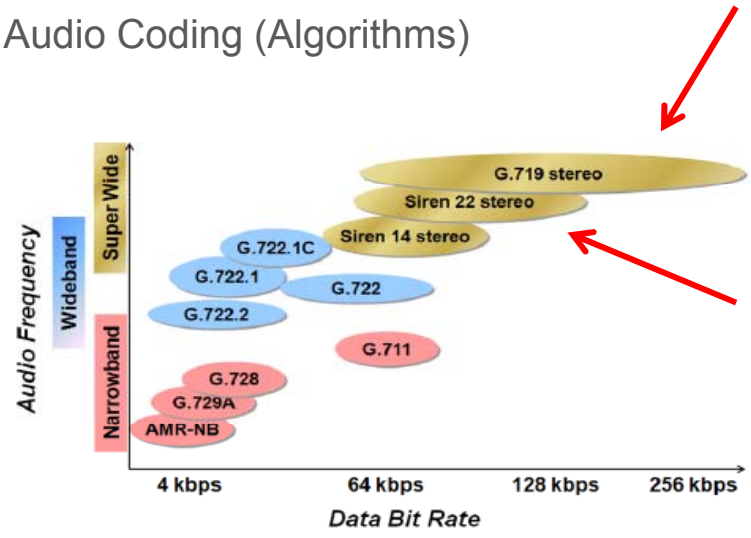
- Limited frequency up to 7kHz
- Mono instead of stereo sound
- Low bit rate of 8-bit
- 48-64kbps bandwidth for audio
- Lack of dynamics and dynamic range
- Muting loss or interruption of sound transmission
- Network or codec latency = compressed audio/visual
- Echo cancellation artifacts = noise, echo, squealing sounds

Polycom MUSIC MODE

- Polycom Engineers, in collaboration with MSM, produced Music Mode which is **designed for the transmission of LIVE interactive acoustic music performance and exchanges**
- But what is it?
- What changed?

Music Mode is a combination of Audio
AND Acoustic amendments

Audio Coding (Algorithms)



Audio Codec Comparisons

	Bandwidth	Bit rate	Delay	Complexity	Standard	Algorithm
SIREN22	22 kHz	32-64 kbps mono 64-128 kbps stereo	40 ms	18.4 MIPS	N/A	Transform
G.719	20 kHz	32-128 kbps mono 64-256 kbps stereo	40 ms	17.7 MIPS	ITU	Transform
MP3	≤ 20 kHz	64-384 kbps	≥ 54 ms	> 100 MIPS	ISO	Transform
MPEG-4 AAC-LD	≤ 20 kHz	24-192 kbps (TAA: 64 kbps mono 128 kbps stereo)	≥ 20 ms	> 130 MIPS	ISO	Transform

Additional Acoustic Technologies which destroy music delivery

- Automatic Gain Control
- Automatic Noise Suppression and Noise Fill
- Acoustic Echo Cancellation

One More Factor Cruicial to Music Delivery
BANDWIDTH

Resolution / Frame Rate	H.264 Baseline Profile (Industry Norm Today) Call Speed in kbps	H.264 High Profile Only from Polycom Call Speed in kbps	Polycom Bandwidth Reduction
CIF 30	128	64	Up to 50 %!
4CIF30	256	128	
4CIF60	1024	512	
720p30	1024	512	
720p60	1512	832	
1080p30	2048	1024	

Table 2 - Video Quality and Required Network Bandwidth

NOW TO SHOW YOU THE VALUE OF MUSIC MODE...LET'S CROSS TO NATHAN SCOTT LIVE FROM UNIVERSITY OF NEWCASTLE...

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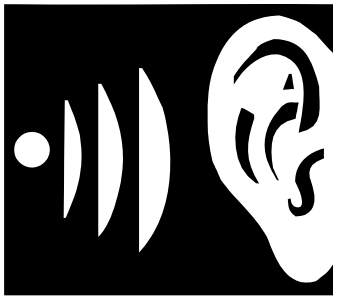
Let’s hear the difference…



Distance Education - Music

Case Studies

Further information?

If you would like a free copy of the white paper ***'MUSIC PERFORMANCE AND INSTRUCTION OVER HIGH-SPEED NETWORKS'*** *visit the Polycom stand*

Technical Information for this presentation was taken from the Whitepaper mentioned above.

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