Digital Collaboration

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Collaboration

- Historical nature of musical collaboration
- Nature of electroacoustic music

- Collaboration within electroacoustic music
  - Performers and electronics
  - Performers and offline DSP
  - Performers and Real time DSP
  - Networked Performers

Real Time DSP

KIM's in the Sun

- 1977 Jim Horton and Rich Gold
  - 2 KIM's p2p
  - Polling based
- Blind Lemon Gallery 1978
  - The League of Automatic Music Composers
  - Jim Horton, Rich Gold & John Bischoff
  - 3 Micros Token Ringed
  - Interrupt based

The Hub

- 1985 -1999 developed from The LAMC
- Server based network
- Common clock
- Hardware neutral protocol
- Propriety Format
- Control data transmission

Realtime collaboration

- Requirements of system
  - Reliable, Stable
  - Built in redundancy
  - Platform neutral
  - Non proprietary

Example situation

- 20 geographically local musicians
- Collaborating on control and audio data

Solution

- Ethernet communication for control
  - Wired, Wireless
- Isolated network
- Open and platform neutral protocol for control data transmission
  - Midi, OSC
- Audio handled as separate audio network

LAN issues

- Bandwidth requirement
- Reliability
- Latency
- Jitter

TCP or UDP

- Transmission Control Protocol (TCP)
  - Handshake
  - Larger packet size
  - Congestion Control
  - Guaranteed packet arrival
- User Datagram Protocol (UDP)
  - No handshake
  - Reduced packet size
  - Packet loss possible

LAN to WAN

- Restrictions on WAN
- Security requirements
- Audio must be network hosted
- Significance of LAN issues increased

Audio issues

- Low latency requirement
- Synchronisation
- Audio high bandwidth requirement
  - Localise audio at performance
  - Localise audio at localities
  - High compression

Audio

- Streaming server structure between peers
- Shoutcast
- Icecast2
- Quicktime / Darwin streaming server
- Clients and servers locally hosted
- Free choice of transport so use UDP
- Audio requirements often beyond infrastructure

piksel04

- Norway 2004
- Streaming audio and video within LAN environment
- Open source advocates
- Drop in solution as fully GPL'd

Alternative Strageies

- Low quality non performance stream
  - Audio monitoring only over network
- Sample playback model
  - Control data triggers playback and other parameters
  - Similar to non real time collaboration

Non real time

- Collaborating off line on a single creative project
  - Traditionally done with postal system
  - Requires format agreement: midi, protools, logic
- Distribution
  - p2p - hard to manage
  - Single repository - expensive
- Requires effective file management

File Management

- Versioning
  - Requires internal searching
- Distribution
- Readable file format
  - Universal file format open standard

The environment

- Real time
  - IM
  - Chatroom
  - Workspaces
  - Wiki's
- Off line
  - Email
  - website

Beyond

- Real time models provide interesting local machine abstractions
- Opportunities for multiple live venues
  - Venue in your room
- Collaboration through non musical frameworks
- Music created by the network