Multi-Channel Serial Digital Video Transmission, Distribution, and Reception

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October 19th, 2000

The 142nd SMPTE Technical Conference & Exhibition
Pasadena Convention Center, Pasadena, CA
Agenda

• Genesis of this video project
• Seamless Tiling
• Video Standards Adopted
• System Overview
• Transmitter, Receiver, & Distributor
• Challenges & Conclusions
• Next Steps
• Acknowledgements
Genesis of this Video Project

• Honeywell researched and developed technologies for seamlessly tiling arrays of displays to render ultra-high resolution imagery
• But, there was no video distribution scheme to deliver ultra-high resolution imagery
• Hence this Video Project!
Seamless Tiling - System

Scalable size, shape, aspect ratio, resolution, & arbitrary projection surface
Seamless Tiling - Applications
Video Standards

• SMPTE 259
  – Serial Digital Interface (SDI)
• SMPTE 125M
  – Bit Parallel Digital Interface
  – ITU-R 601 (MPEG)
• MPEG
  – Motion Picture Experts Group
• Panel Link, IEEE-1394, LVDS - Not used here
System - Overview

- **Objective**
  - To deliver 2560x2048 video @ 30fps

- **Hurdle**
  - Deliver a MxN array of video streams to a JxK array of seamlessly tiled displays

- **Solution**
  - We have it!

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4x4  2x2
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System - Block Diagram
Transmitter

- 2 PCI cards with 8 channels each
- 16 8-bit ITU-R 601 video channels are brought into the transmitter on short ribbon cables
- Serializer
  - Converts 8-bit ITU-R 601 into SDI (270MHz)
  - Gennum GS9032 Digital Video Serializer used
- 16 coaxial cables carry these SDI video streams from the PC to the VME chassis
• 9 channels on each VME CCA
• SDI over Coax is the input to each channel
• De-Serializer
  – Converts SDI to 8-bit ITU-R 601
  – Gennum GS9025 Serial Digital Receiver & GS9020 Serial Digital Video Input Processor used
• 8-bit ITU-R601 is routed to FPGA on CCA
• Requirements
  – Source up to 9 channels to each VME CCA
  – Route channels to more than one VME CCA
  – Support up to 4 VME CCAs

• Distribution
  – SDI is re-distributed to other VME CCAs
  – Loop through feature on Receiver used
  – Gennum GS9028 Cable Driver used
Challenges

• Real Estate for 16 Transmitters in a PC with 4 PCI slots taken by MPEG decoders
• Tapping into the digital stream of COTS MPEG decoder card
• VME CCA Front panel real estate
• Re-routing SDI channels from one VME CCA to adjacent CCAs
Signal Flow

4x4 → 2x2 → Seamlessly Tiled

640x480 → 1280x1024 → 2560x2048

Low → High → Ultra-High
Conclusions

• System Features
  – Delivers a 4x4 array of video streams to a 2x2 array of seamlessly tiled displays
  – Supports a 2560x2048 display system
  – Scalable architecture

• Beyond SDI
  – Need new higher resolution Serial Digital Standards (DVI, FPD, etc.)
Next Steps

• Patent applications pending

• Invitation for interaction
  – Further the seamless tiling technology and applications

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Acknowledgements

• Co-authors
  – Mike Johnson, Norm Tarleton

• Seamlessly Tiled Display System Team
  – CJ Chen, Jim Ackerman, Bill Hancock, and others

• Lab Manager
  – Walter Scott

• SMPTE
  – Opportunity to share this project experience