Today’s Presentation:

Digital AV In The Classroom

Your Presenter Today is…

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Our Agenda

• A Look At Media, Analog And Digital
  – The transition from analog to digital, what it means and when it will happen
  – How the analog interface is affected

• New Developments In AV
  – More pixels, more interactivity, more everything…

• Connectivity in the 21st Century Classroom
  – DisplayPort
  – HDMI
  – HDBaseT
  – USB
  – Miracast
“Change before you have to.” – Jack Welch

MEDIA, ANALOG AND DIGITAL
A Look Into The Past

• Analog video technology remained largely unchanged since the first coast-to-coast color broadcast of the Tournament of Roses Parade on January 1, 1954

• Analog systems are susceptible to signal loss, distortion and very limited generational fidelity
  – Stored content is large and delicate
  – Random access is very difficult to implement
Then and Now

1982
Addition of stereo sound to television video

1992
Video games and surround sound, Mosaic web browser

2002
DVD goes mainstream, Netscape Navigator loses to IE, DirecTV introduces “music downloads”

2012
You listen to radio on your cell phone, your computer is a tablet, your cable TV is now a network connection, and you can’t remember the last time you saw a pay phone!
Today Is A Digital Day

- Phones, Phablets, Tablets, Ultrabooks and Smart Displays feature interactive HD touchscreen capability
  - Connect from anything and everything
  - Communicate to anyone, anywhere, anytime
  - It’s digital; it’s HDMI, it’s DisplayPort, it’s USB

- Technology for home, school or office are no longer differentiated
  - Our most pressing AV infrastructure challenge is the integration of personal devices into the education environment… BYOD!
In 2010 Intel, AMD, Dell, Lenovo, Samsung, LG and many others decided the fate of analog AV
- The computer industry adopted DisplayPort technology as a replacement for VGA connectivity
- HD15 (VGA) connectivity will be essentially obsolete by 2018
- DVI-D connectivity will lose industry support next year

We are the analog migrants to this new digital world…
And We Can’t Go Back!

• Digital Millennium Copyright Act
  – DMCA criminalizes production and dissemination of technology, devices, or services intended to circumvent measures (commonly known as digital rights management or DRM) that control access to copyrighted works. It also criminalizes the act of circumventing an access control, *whether or not there is actual infringement of copyright itself*

• *You Can Not Convert From Content Protected Digital To Analog!*
Limiting Digital

- **ICT Image Constraint Token**
  - Activated by the content creator during the mastering process
  - Downgrades native high-resolution (1080p) to standard-resolution (480i) for analog output

- **DOT Digital-Only Token**
  - Activated by the content creator during the mastering process, but may also be implemented at the hardware level
  - Prevents display of any image when connected via an analog pathway
Digital Natives

- Integration of work and personal technology
- Integration of mobile and stationary devices and networks
- Integration of A/V, IT and telephony functionality
- Integration of cloud and premise storage
“What we call 'Progress' is the exchange of one nuisance for another nuisance.” — Havelock Ellis

NEW DEVELOPMENTS
Adding Pixels

1920 pixels

4 Times HD Resolution

1920 pixels

1920 pixels

1920 pixels
UltraHD Market Growth

• UltraHD delivers 8M Pixel images
  – Ideal for multitasking on large interactive displays
• IHS is forecasting huge growth for 2014 with shipments soaring by 500% to reach 10 million installed panels
  – Rising to 66.2 million by end-2018
Adding Dimensions

- **Illinois** - students exposed to lessons using 3D presentation technology “saw a 35 percent increase” in post-lesson test scores

- **Florida** – Students are “much more interested in the 3D lessons. When they see the glasses come out, they’re excited – even if the topic isn’t the most interesting one.”

- **Colorado** – “We firmly believe that 3D video will open up a world of new, enhanced learning by making visualization a core support for the curriculum”
Digital Video And “3D” Content

- **Anaglyph**
  - Typified by color filter glasses identified by a separate stylish and distinctive color lens, red for one eye and green for the other

- **Polarized systems**
  - Use 2 images “pasted” over each other and a polarized 3D lens with filters that block the opposing polarized light

- **Eclipse systems**
  - Shutter glasses block alternating images

- **Auto-Stereoscopic systems**
  - "Glasses-free 3D" or "glassesless 3D"
Adding Interactivity

- Due to shifts in how humans perceive and interact with technology, and each other, the global interactive display market is expected to explode in 2016 and beyond.
- Interactive video touch-screen technology market penetration will double by 2016.
  - The market is expected to expand at a compound annual growth rate (CAGR) of 50% or more for the years 2013 through 2017.
"Increasingly, the computers of the very near future will be the private property of individuals, and this will gradually return to the individual the power to determine patterns of education. Education will become more of a private act... There will be new opportunities for imagination and originality."

- Mindstorms by Seymour Papert
“An education isn't how much you have committed to memory, or even how much you know. It's being able to differentiate between what you do know and what you don't.” — Anatole France

CONNECTIVITY IN THE 21ST CENTURY CLASSROOM
• Projected 31.6% CAGR Over Next 5 Years
  – Adoption has increased from just 80 million ports in 2010 to 225M in 2012 and more than 450M in 2013
  – Projected to double again in 2014
• DisplayPort is *the world standard* for accessing AV content from IT devices
  – Thunderbolt is based on Mini DisplayPort technology
  – DisplayPort can move seamlessly into (and out of) the HDMI format for unified connectivity
HDMI

• In 2004 there were 25 HDMI enabled devices on the market, today, the installed base is more than 4 billion units
  – More than 950 million new devices shipped in 2013
  – Projected 19.7% CAGR over next 5 years

• HDMI is the worldwide standard for accessing AV content from multimedia devices
• Supports 5-play capability
  – Digital video with up to UltraHD resolution
  – 8 channels of uncompressed digital audio
  – Ethernet at 100mb/s
  – Control via CEC, IR, RS232 and USB
  – Power – up to 100 watts

• HDBaseT is the global standard for comprehensive connectivity over a single category cable
  – New solutions showing at InfoComm 2014 will support DisplayPort USB 2.0 and UltraHD!
USB and Interactivity

• Interactive displays use the “human interface device” (HID) category of USB technology

• Interactive displays place significant demands on the integrity of the USB system
  – Designers, integrators and system operators need a solid education in USB technology fundamentals

• It is has interactive characteristics, its likely has a USB connection!
Universal Serial Bus

• USB was designed to standardize the connection of computer peripherals
  – Eliminated the need for separate power supplies for devices
• USB was born of the need for plug-and-play technology
• USB allows the flow of information into and out of a computer (host)
• USB 2.0 is the industry standard for connection to interactive video panels and devices of all types
“The most exciting breakthroughs of the 21st century will not occur because of technology but because of an expanding concept of what it means to be human.” - John Naisbitt

WHAT ABOUT WIRELESS?
The Network Can’t Handle It

• Over 50% of North American Internet traffic consists of YouTube and Netflix programming!
• Enterprise IT networks are struggling to keep up with bandwidth demands
• Every device added to the network is a potential security breach
• By 2016 there will be 4 network-connected devices for each and every person on the planet!
Airplay and Chromecast Flow Example
Miracast

Topology 1: Direct Source to Display
No AP present

Topology 2: Source with access to AP and direct connection to Display
Content may be streamed from AP to Source to Display

Topology 3: Direct Source to Display, AP present, but not connected
AP may be aware of Wi-Fi Miracast devices, but it is not connected to them

Topology 4: Source and Display connected to each other and to AP
Source may stream content from itself or through AP
Miracast Simplifies

- Wirelessly move from curriculum content to web content to document camera utility
- Share connectivity easily and intuitively with confidence
“A conclusion is the place where you got tired of thinking.” – Harold Fricklestein

IN CONCLUSION…
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- HDMI, DisplayPort and USB will be a part of every classroom going forward
- HDBaseT is an excellent choice for structured AV wiring because of 5Play
- HDCP encryption and the DMCA means we can’t reliably convert digital content to an analog format
- USB 2.0 connectivity is a part of nearly all interactive devices and displays
- Miracast offers ex-network wireless connectivity that supports BYOD and creative integration of mobile devices
“A prudent question is one-half of wisdom.” – Francis Bacon

QUESTIONS?
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