High Definition Video at the University of Costa Rica

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Introduction in HDTV
Looking for applications
Civil Engineering Applications
Medicine Applications
Introduction in HDTV
First Steps

- Ideas from Production Techniques for Effective HD TV Video Conferences / Internet2 Spring 2006 Member Meeting.
- Use HDTV on scientific applications.
- Add Value.
- Create auto-provisioned solutions.
- When possible use Open Standards.
- Buy some equipment to give a try.
Next Step

- Buy Equipment:
  - 2 Cameras Sony HVR-A1N
    (recommended HVR-Z1U but not available for Latin America!!!)
  - 2 Macpro’s dual Xeon+Decklink HD Ex
  - 2 Lowells’ lights kit.
- No Aja Cards, no Plasma/LCD TV -> Not enough money
To Building End Points

GigE-TX

Issues:
No Aja Cards
No HD Display (analog)
No Sound
Need more network links
Alternative

Issues:
Very simple
HDV compressed quality
Any client with VLC
Any network

100 Mbps
## HD Resolutions

<table>
<thead>
<tr>
<th>Software</th>
<th>Tech</th>
<th>Pixel Res.</th>
<th>Compres</th>
<th>BW required</th>
<th>Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>iHDTV</td>
<td>1080i</td>
<td>1920x1080</td>
<td>No</td>
<td>1.5 Gbps</td>
<td>~0 sec.</td>
</tr>
<tr>
<td>HDVTS / VLC</td>
<td>HDV1080i</td>
<td>1440x1080</td>
<td>MPEG2</td>
<td>25-30Mbps</td>
<td>2-3 sec.</td>
</tr>
</tbody>
</table>
HD Resolutions (tested)
Finding Stakeholders

- Colleagues doing HTDV at UCR
  - Giuseppe Cirotti - Audiovisual Production Unit from Social Action area.
  - Rogelio Jimenez - Audiovisual Production Center from Collective Communications School.
Questions from group?

• Is the Sony HVR-A1N the best choice to do HDTV?

• Who really needs the resolution of HDTV at work? And if needed, which one is the appropriate resolution: HD720p, HD1080i or HDV1080i, HD1080p?

• What is better 720 progressive or 1080 interlaced?

• Why use analog output signal from a digital camera to convert to digital again?
Looking for applications
Applications

- Civil Engineering:
  - National Laboratory of Materials and Structural Models (LANAMME-UCR)

- Medicine:
  - Department of Anatomy, Medicine Faculty.
Civil Engineering

• Goal: Develop a remote testing in the strong floor facility of LANAMME to develop the knowledge to integrate LANAMME to the program NEES.

• Planned setup (At Lab):
  • Two HDV cameras and lights.
  • One VC end point standard equipment.
  • One computer to control the servo-hydraulic actuator.
Civil Engineering

- Setup: Remote Site:
  - 2 projectors for the streaming from the lab.
  - 1 VC end point equipment.
  - 1 PC to control remotely the PC which controls the servo-hydraulic actuator.
Civil Engineering

- **Network Setup (Campus):**
  - A dedicated VLAN on network of UCR at 100Mbps.
  - Multicast enable in case of have multiple viewers on campus.

- **Network Setup (NREN):**
  - A dedicated MPLS VPN at 45Mbps.
Procedure

- **Time**: Preparation of test: weeks or months, duration of test: 1 day (8 hours)
- **Location**: Teacher and students at remote site.
- The teacher conducts the test with the students in real time, while they have to analyze the partial results.
- According with results, they can to decide to change parameters of the servo-hydraulic actuator and repeat the exercises.
Scenario

Remote Room
Status of test

- The test was suspended because a severe failure of the servo-hydraulic actuator.
- The replacement of the part will need a few months.
- The test was re-scheduled until May 2008
Medicine Applications
Medicine

• Interested user, director of the Department of Anatomy of Faculty of Medicine, Dr. Marco Zuñiga.

• Ideas to use HDTV video:
  • Transmit a surgery in real time, from a hospital to a room class at University
  • Produce videos to be used by teachers of medicine and students.
Transmit a Surgery

- The bioethics is critical in the management of information.

- Things to do:
  - Define: subject, goals, focus group and the facilities to use.
  - Setup the network from hospital to University.
  - Request authorizations to medic committee and the administration of the clinic.
Transmit a Surgery

- Things to do: (Cont.)
  - Request support from the IT department of Costa Rican Social Insurance Fund (C.C.S.S.)
  - Setup equipment in both sides.
  - Avoid obtrusiveness at surgical room.
Feasibility of the Network
Feasibility of the Network
Feasibility of the Network CR2Net

• Brings access to 7 institutions at 45 Mbps at no cost by 4 years (By Executive Order of the Ministry of Science and Technology).

• Up to 1 Gbps through a MPLS VPN.

• Includes: University of Costa Rica and Costa Rican Social Insurance Fund (CCSS)
Site of the Surgery

- Hospital San Rafael de Alajuela (CCSS)
  - The Dr. Zuñiga is surgeon in exercise in that center and coordinator of the bioethics committee.
  - The building is recently finished, includes network wired at surgery room and fiber optic access to the building.
Map of sites
Setup of surgery room

- Still in process. Already has permissions to access to the surgery room to evaluate the requirements.
- We will use HDV1080i because bandwidth available in CR2Net is 45Mbps.
- We need to include the Hospital to the Network of CR2Net.
- The test is scheduled to May 2008
Produce Videos to be used by teachers of medicine and students
Video production
Dissection Material
Sessions at Dissection Lab

• Session 1:
  • With HDV Camera, without additional lights.
  • Just give some footage in the lab with students.
  • The doctor recommends to do a session without students and based on the goals of the course.
Session I
Session 2

• The script of the sessions is based in the goals of the course.

• There is video-clip for each goal. We cover two goals in this session. The duration of each clip is near 8 minutes.

• We use a SD camera to compare the detail and evaluate if is necessary HDTV.
Demo
Session 3

• Includes:
  • Professional lights
  • HDV Camera
  • TV technician

• Excludes:
  • SD Camera
Setup of the Dissection Lab

Recording on tape in format HDV1080i
Setup of the Dissection Lab

Change camera position to obtain details
Results

• HDTV Video adds value to the process of learn dissection.

• Hard to find human material in good condition!!!

• Reduce the difficulty of the students.

• Creates a new kind of didactic material.
Results

• It’s recommended a permanent installation of the systems.
• The solution should cost less then $10k.
• It’s necessary to create a jib for the camera, the design will be coordinate with television experts.
Design of prototype

- The goal is create a solution to produce HDTV material by the doctor or assistant without the need of TV experts.

- HDV Camera
- 360 Flexible Jib
- Small networked PC
- Firewire to cam
Conclusions

• The delay in HDV1080i is acceptable in some applications and considering cost/benefit is a good solution.

• It is possible to deploy many small solutions based in HDV1080i and create the culture of use HDTV.

• HDV 1080i is not the better technology in bandwidth consumption, but keeps good quality and is very simple to use.
Other conclusions

- Record clips in HDTV uncompressed is very hard and expensive:
  - To record a footage of 47 sec of HD uncompressed was required a SAN with fiber channel and 8 hard drives. Each 10 sec require 1 GB of storage.
  - An expensive capture card (Blackmagic Decklink HD Extreme).
Participants

- Dr. Marco Zuñiga-Montero, Dpt. of Anatomy - UCR
- Dr. Sixto Bogantes, Dpt. of Anatomy, UCR
- Eng. Giuseppe Cirotti, UPA
- Rebeca Montero, Canal 15 - UCR
- PhD. Guillermo Santana, LANAMME-UCR
Questions?