

CREATING INTERACTIVE VIDEO BROADCASTING SYSTEM FOR VBLHEP

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The article describes the creation of a web service, which combines the possibility of organizing video broadcasts and video conferences for the VBLHEP, JINR events. Software and hardware components used for the organization of video streaming and video conferencing are presented.

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INTRODUCTION

While preparing for the International Symposium “SPIN2012”, which took place at VBLHEP, JINR, the need to equip the conference hall with a video broadcast system occurred. It was necessary for scientists, unable to attend the conference in Dubna, to have the opportunity to watch live presentations or use the video archive. The video broadcasting system is being continuously improved as there are new requirements for its operation. Firstly, the video broadcasting should be on-line with a load of more than 200 people from around the world at the same time. Secondly, it is necessary to see and hear the speaker and moderator and to broadcast the speaker’s presentation video for a remote viewer. Thirdly, the web service is to provide a simple and comprehensible interface and to display the requested multimedia data using any platform and any browser. Fourthly, it is required to record each presentation, store the video, and provide remote access to the video archive. Finally, the possibility to add video conferencing to remote viewers for them to be able to ask voice questions online is needed.

Today the task of organizing remote video streaming and video conferencing is of current interest. Quantities of information are increasing faster than ever, and many people cannot afford physical presence at the conference, but they want to keep abreast of the latest information. In this situation, the only way is to be a remote viewer.

COMPONENTS FOR VIDEO BROADCAST ORGANIZATION

To carry out video streaming, it is required to use special equipment that may be implemented as hardware-based solutions and systems, as well as software for PC, mobile devices, or web browsers.

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Video broadcast can be organized in several ways. The first method is to use ready-paid web services on the Internet that can provide services to the video server and video player. The second way is to buy expensive hardware video server. In connection with the existing network and server infrastructure, it was decided to economize by self-installation of all software on the server.

Video broadcast presupposes the use of at least four main components: camcorder, encoder, video server, and video player.

There are four types of camcorders: analog cameras, network cameras, USB web camera, and camera software emulator. The main objective of the camcorder is to provide good resolution of the resulting video, with different shooting conditions. The camera captures a video image and sends it as a data stream.

The encoder is used to convert the data stream from the camera to the desired format and provide it with the transmission of multimedia data transfer protocol (Apple HTTP Live Streaming, Flash HTTP Streaming, RTSP/RTP, RTMP). There are both hardware encoders (Epiphan VGA2USB Grabber, AXIS Q7401, ViewCastNiagra 2120) and software encoders (Windows Media Encoder, Adobe FMLE, WireCast, VLC), and an encoder can be integrated into the camera or video player.

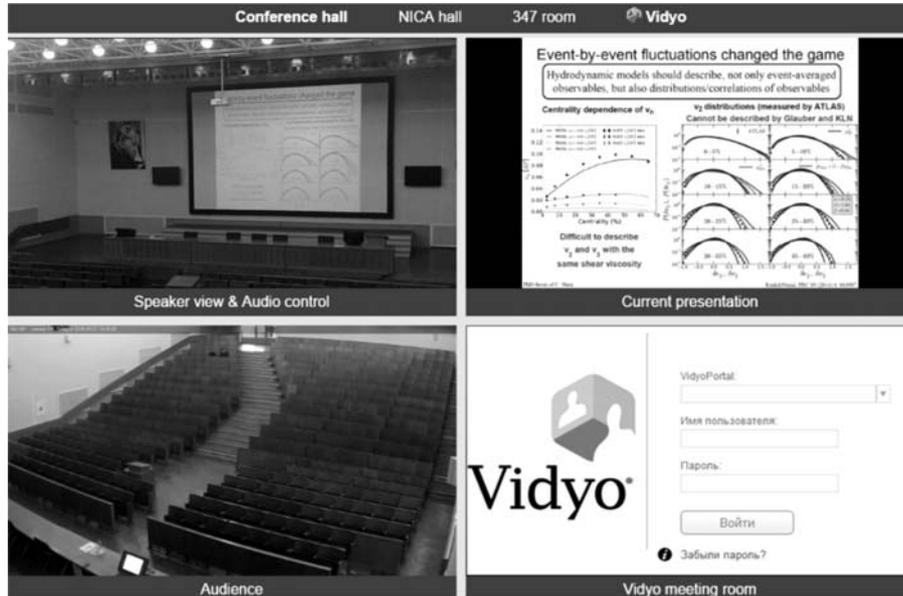
All video streams that can be retransmitted, recorded, transcoded, or just given a different protocol are registered in the video server. Software video servers (Adobe Flash Streaming Server, Windows Media Services, Wowza Streaming Engine, Erlyvideo, Red5) have several advantages over hardware ones (Cisco/TANDBERG, Vidicor, Polycom, Epiphan VGA BroadcasterLite). They have a flexible configuration and open architecture that allows one to build and modify the parameters of the system as needed, but there are some problems with the selection of the video server. The Microsoft products use only Silverlight format of the video stream, the Adobe products use only Flash. These characteristics impose restrictions on the use of the operating system by the end user, like Adobe Flash is not officially supported on devices from Apple. A video server Wowza Streaming Engine [1], which works with different formats of video streams, allowing the display of multimedia data requested on any platform and with any browser, turned out to be different from the others.

The video player works on a client's side, i.e., it launches using the program or the browser, takes the processed media data from the video server, and plays them to the end user.

A camera, an encoder, a video server, and a video player can be combined into one device or combined with each other, but in this case they are not always a complete substitute for individual devices. For example, there are network cameras that can combine the video server and video player, but due to the weak hardware power, they can give the video stream no more than 20 remote viewers, as well as Polycom devices, designed for video conferencing, cannot be used for video broadcasting.

CREATING A VIDEO BROADCAST SERVICE

Basing on the requirements, the remote viewer is to be provided with two video streams: a long shot with the reporter and presenter, and the presentation itself. For a long shot a Dome Network Camera Axis Q6035 with a built-in encoder is used. To combine the audio aspect, an audio mixer, which was collecting sound from all microphones and sound sources in the room and sending them to the network camera, is used. Thus, it is possible to see and



Web interface for interactive video broadcasting system

hear everything that happens at the conference using a network camera. Further, the network camera sends a video stream of RTP/RTSP protocol video server, which in turn uses the RTMP protocol for transmission of the data to the client's video player.

A power point presentation is transferred to the video server using a camera emulator VH ScreenCaptureDriver and a software encoder Adobe FMLE [2] protocol — RTP/RTSP. A camera emulator is to be set up once and it will always run with the system, emulating a webcam and showing everything that happens on the desktop, including programs that are running.

Setting up of the video server Wowza Streaming Engine occurs via configuration files written in XML. For a quick start it is enough to launch an unpacking examples script and add two video streams from our sources to the configuration. Then it remains only to pick up the streams from the video server and display them on the website.

The website was created in the content management system Drupal [3]. To display video streams on the website, the video player flowplayer [4], which can play not only a flash video stream, but also HTML5, is used.

For flowplayer tuning a configuration in javascript language, which can be seen on the web site service <http://lheplive.jinr.ru>, if the browser is switched to code view mode, was written. As a result, we create a web interface that can be seen in the Figure.

CONCLUSIONS

Video broadcast from the conference SPIN2012 was observed simultaneously by about 160 remote viewers from around the world. All participants had the opportunity to see and hear the speaker, presenter, and also to see the presentation.

A video broadcast service at the VBLHEP conference hall has been constantly working for more than two years. Scientists use this service in all workshops taking place not only in the conference hall but also in other halls for video conferencing. It has become more convenient for many people to watch the video broadcast than to attend a workshop, thanks to sound quality, saving of time, and high-quality picture providing all details of the presentation. Some elements, that make it possible to ask questions remotely or to organize group video meetings using popular programs Vidyo or Skype, were added.

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