

Design and Implementation of All-Media Studio for Luoyang Broadcasting and Television Station (Postprint)

Authors: Meng Guili

Date: 2023-10-08T00:00:00+00:00

Abstract

To better adapt to the omnimedia era, the omnimedia studio of Luoyang Radio and Television Station was completed and commissioned in June 2016. This system is primarily utilized for live broadcasting and recording of news, special-topic, and interview programs. This paper introduces the design and implementation of the studio from aspects including stage art system design, media management and graphics packaging system design, video and audio system integration design, technical challenges and solutions.

Full Text

Preamble

Title: Design and Implementation of the All-Media Studio at Luoyang Radio and Television Station

Abstract: To better adapt to the all-media era, Luoyang Radio and Television Station's all-media studio was completed and put into operation in June 2016. This system is primarily used for live broadcasting and recording of news, feature, and talk show programs. This paper introduces the design and implementation of the studio from the aspects of stage art system design, media management and graphic packaging system design, audio-video system integration design, technical challenges, and solutions.

Keywords: Stage Art System; All-Media HD Studio; Graphic Packaging System; DVI Matrix

CLC Number: N948.12

Document Code: A

Article ID: 1671-0134(2018)08-064-02

DOI: 10.19483/j.cnki.11-4653/n.2018.08.023

To meet the requirements of all-media convergence development, Luoyang Radio and Television Station built a high-definition all-media studio in June 2016. Positioned as an all-media, high-definition, multi-scene, and multi-functional studio with physical sets as the main feature, it produces three flagship live programs daily: *Luoyang News*, *Live Luoyang*, and *Hotline for Work Style*. Additionally, it records numerous programs including *Midday Report*, *County Edition of News*, *News Focus*, and *Journey Through Heluo*, making its workload extremely heavy.

1. All-Media Studio Construction Plan

The studio measures 19.6 meters long, 16.8 meters wide, with a total area of approximately 330 square meters and a clear height exceeding 6 meters. It utilizes three walls and three corners to achieve unified control, scheduling, and management of the joint-screen broadcasting system, touch commentary system, online graphic packaging system, subtitle machine, foreground virtual insertion (virtual graphic packaging) system, and lighting control. Before each program begins, the program schedule for all subsystems is arranged according to the program flow. During broadcast, the system controls the play and stop functions of all subsystems according to this schedule, which not only saves human resources but also ensures perfect coordination among systems, making the entire program recording and broadcasting process more streamlined.

1.3 Audio-Video System Integration Design

The audio-video system design fully considers usability, stability, and reliability while also addressing advanced features, compatibility, and scalability to meet live program requirements. The system core employs internationally renowned brand products and adopts a modular design approach for easy expansion. Given the high security requirements for news broadcasting, all subsystems—including video, audio, synchronization, monitoring, transmission, and recording—have backup systems to ensure safe and reliable live broadcasting. The system comprises five channels, centered around a Sony MVS-3000 32-channel HD switcher, supplemented by Panasonic HD cameras, a Harris 48\$×\$48 multi-format digital video matrix, two Dayang VIPS-2S-4XHD video broadcast servers, a Yamaha 32-channel digital mixing console, and other peripheral equipment. Video signal sources enter and exit the switcher, with all HD signals directly participating in switcher production and SD signal sources participating in HD production through up-converters. Two output video signals from the switcher are sent to optical terminals or interface panels via embedders, down-converters, and video distribution amplifiers. The emergency channel of the system uses one bus output of the matrix to output HD video signals, which are then superimposed with subtitles through a keyer. Two signals are sent to two emergency switches, embedders, video distribution amplifiers, optical terminals, recording equipment, and other terminals.

2. Technical Challenges and Solutions

The most complex aspect of constructing Luoyang Radio and Television Station's all-media news live broadcasting studio was the stage art design. To extend the service life of the stage design and adapt to program adjustment needs, a large number of screens were adopted for program logo display. To enable hosts to interact with large screens and display various types of information, the entire studio includes 13 screens of various types, including P2.5 LED large screens, triple screens, touch commentary screens, interview screens, and atmosphere screens. The signal source system includes one large-screen broadcasting system, two triple-screen broadcasting systems, one touch commentary system, frame memory, and multiple other signal sources. Consequently, the display, scheduling, and security backup of various screen signals became a critical issue.

The display control system uses a DVI matrix as the scheduling center for various screen display information, allowing flexible scheduling of signals for each screen in the studio. The P2.5 LED large screen is the key display for live broadcasting. In addition to configuring main and backup video signal processing, the DVI matrix is equipped with dual power supplies. Should the DVI matrix fail, the large-screen broadcast signal backed up in the switcher's frame memory can bypass the DVI matrix and be sent directly to the large-screen signal processor to ensure uninterrupted broadcasting.

[Figure 3: see original paper] 16\$×\$16 DVI Matrix Signal Source Diagram

Since its launch, Luoyang Radio and Television Station's all-media studio has operated stably with all systems functioning normally, achieving excellent results. For live broadcasting of civic news programs, various weather forecast virtual insertion templates have been specially produced. During the annual Peony Festival, virtual insertion templates featuring peony scenes were created. The online packaging system overlays real-time financial data and real-time sports information on program images, and can also add background graphic packaging and over-the-shoulder title graphics for hosts, achieving seamless program continuity and advancement.

For live talk shows, peony elements were incorporated into the program packaging, using Luoyang's peony flowers as textures for rotating 3D spheres for name tags, titles, and bottom crawls on the *Hotline for Work Style* program, highlighting the ancient capital's characteristics and achieving unexpected visual effects. Hosts of *Hotline for Work Style* also interact with the audience, promptly answering questions, improvising commentary on events, or initiating interactive discussion topics.

3. Project Implementation Results

[Figure 2: see original paper] Block Diagram of Various Graphic Packaging Systems

Luoyang Radio and Television Station's all-media studio is a television live

broadcasting system with numerous packaging methods and powerful functions. Various self-produced programs have made their debut in the brand-new studio, bringing a wonderful visual feast to the audience. After more than a year of operation, it has broadcast live over 1,000 times without ever affecting normal program broadcasting. It has met the requirements of high-frequency live broadcasting, leveraged Luoyang's regional news advantages, broken through the inherent bottlenecks of municipal stations, and achieved satisfactory results in all-media convergence.

(Author: Television Technology Department, Luoyang Radio and Television Station, Henan Province)

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.