

## A Postprint of a Broadcasting System Suitable for County-Level Television Stations

**Authors:** Jian Chunli

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

### Abstract

This article analyzes the characteristics of the broadcast system of Manas County TV Station from three aspects: functional list, features and advantages, and typical applications, as well as the effects produced after the implementation of this broadcast system. This broadcast system greatly improves work efficiency while offering higher security, advancement, and information resource sharing capability.

### Full Text

#### A Broadcasting System Suitable for County-Level Television Stations

**Abstract:** This paper analyzes the characteristics of the broadcasting system deployed at Manas County Television Station from three perspectives: functional modules, features and advantages, and typical applications. It also examines the effects achieved after system implementation. This broadcasting system significantly improves operational efficiency while delivering enhanced security, advanced capabilities, and superior information resource sharing.

**Keywords:** Functional modules; Features and advantages; Typical applications

**Classification Code:** TN948.1

**Document Code:** A

**Article ID:** 1671-0134(2018)05-080-02

**DOI:** 10.19483/j.cnki.11-4653/n.2018.05.023

Safe broadcasting has always been a critical metric that television stations must prioritize. Currently, all TV stations invest heavily in technical upgrades to their broadcasting control systems to ensure zero-error safe broadcasting. Previously, Manas Television Station relied primarily on external signals and hard disk files

for its program sources. To enable comprehensive networking for future high-definition broadcasting operations, the station undertook a complete system upgrade to an integrated HD/SD compatible playout system.

In the second half of 2017, Manas County Television Station procured through public tender and installed an advanced broadcasting system from Beijing Zhongke Dayang Technology Company. This system's primary advantages lie in its comprehensive functional modules, distinctive features, and versatile applications.

## **1. Functional Modules**

The broadcasting system comprises seven core modules: acquisition, transcoding, file import, technical review, material import, playlist editing, and playout.

### **1.1 Acquisition**

The acquisition module supports both line signal acquisition and VTR (Video Tape Recorder) acquisition. Line signal acquisition offers multiple modes including scheduled acquisition, fixed-duration acquisition, manual acquisition, and batch acquisition, with support for matrix control. VTR acquisition enables VTR device control, material file naming, fixed-duration acquisition, point-specific acquisition, batch acquisition, signal loop-out acquisition, simultaneous upload and preview, automatic saving of upload tasks, and resumption of interrupted uploads. The system supports multi-format, multi-channel acquisition to accommodate diverse source materials.

### **1.2 Transcoding**

The transcoding module provides format preview capabilities, allowing operators to verify output settings before processing.

### **1.3 File Import**

File import functionality includes pre-import preview and editing, with source support for files, Blu-ray discs, P2 cards, DVDs, and batch import operations.

### **1.4 Technical Review**

The technical review module implements directory monitoring, standard technical review metrics, and template-based management of review parameters to ensure consistent quality control.

### **1.5 Material Import**

Material import consists of two integrated stages: database entry and technical review. The database entry stage automatically creates database records upon

import, allows configuration of source and target paths, supports folder generation, categorizes materials, and generates database files upon completion. The technical review stage performs decoding verification on imported materials to guarantee broadcast safety, conducts comprehensive technical inspections to prevent content errors, implements automatic loudness control, generates loudness profile files, and performs loudness control on both materials and signals.

## 1.6 Playlist Editing

The playlist editing module encompasses search, replace, material editing, playlist creation, program sequencing, merging, subtitle management, direct signal scheduling, audio mixing, grouping, looping, freeze frame, and playlist approval functions.

Search functionality supports exact matching, case-sensitive search, initial pinyin letter search, and fuzzy search. Replacement options include flexible CG replacement and flexible replacement of material content and duration. Material editing allows operators to edit and preview materials with frame-accurate control (play, pause, frame-by-frame, first/last frame, speed adjustment), set aliases for easy retrieval, configure in/out points, add keyframes for material identification, create tags, quickly add materials to filler lists, support playlist creation before upload completion, and enable both button-click and drag-and-drop methods for adding materials to playlists.

Playlist insertion supports timed playback, where the system automatically adds filler materials or uses added materials for automatic coverage. Program lists support import/export functions, distribution capabilities, tree structures, and multi-channel management. Subtitle management includes item-following subtitles, time-based subtitles, independent subtitle loop copying, and independent subtitle playback by time period. Direct signal scheduling allows naming of direct signals, timed broadcast configuration, duration setting, audio override support, and direct signal multiplexing. Audio mixing supports channel mixing, mirroring, overriding, and conversion for both materials and signals. Grouping functions enable material grouping with timed group playback and limited or unlimited loop support. The looping feature supports infinite looping of single materials. Freeze frame functionality allows setting pause at either the first or last frame. Playlist approval implements permission settings, verification, and authorization workflows.

## 1.7 Playout

The playout module supports sequential play, timed broadcast, loop play, pause, drag-and-drop reordering, signal hold, one-click filler broadcast with automatic return to the playlist by time, online playlist editing with full editing capabilities, return window monitoring, one-click mute, automatic up/down conversion, direct signal broadcast, IP stream broadcast, image broadcast, locked control buttons for security, HD/SD simulcast, HD/SD mixed broadcast, matrix con-

trol and switching, and preview of matrix and board signals. An embedded material manager enables editing of materials and broadcast items.

### **1.8 Control Mode**

The system supports both integrated playout-control and separate playout-control architectures, providing flexibility in operational workflows.

### **1.9 Subtitles**

Subtitle management supports position and content configuration for logos, text, and subtitles. It includes item subtitles, channel subtitles, and clock subtitles with half-hour and hourly keying support, as well as HD/SD subtitle mixed broadcast capabilities.

### **1.10 Master-Backup**

The system supports both 1+1 master-backup configurations and more complex N+N+M backup architectures for enhanced redundancy.

### **1.11 Peripherals and Solutions**

The system provides all-station network integration solutions, supporting both local material migration and automatic detection with copying.

### **1.13 Exception Alarms**

Any system exceptions trigger audible and visual alarms for loudness verification, material status, and storage anomalies.

## **2. Features and Advantages**

### **2.1 Key Overlay Technology**

The system supports rich graphic elements including titles, station logos, scrolling text, images, video, animation, and clocks. It enables overlay of logos and subtitles on both hard disk signals and input baseband signals, preserving station logos and clocks even when relaying CCTV signals.

### **2.2 HD/SD Simulcast and Mixed Broadcast**

The system implements advanced HD/SD simulcast technology, where a single server perfectly handles two-channel HD/SD simulcast without requiring additional external equipment. HD/SD mixed broadcast enables per-channel subtitle configuration, per-channel filler settings, and shared material management between channels, providing more flexible and convenient broadcasting.

## 2.3 Breakpoint Resume Technology

In traditional master-backup playout systems, when one server fails or undergoes maintenance, the other operates in single-machine mode. After fault recovery, the repaired machine typically must wait until the next program item begins to synchronize with the normal server. For example, if a 45-minute drama starts at 10:00 and the failed machine is repaired at 10:10, it cannot resume the 10:00 drama and must wait until 10:45 when the drama ends and the next program begins to synchronize.

With breakpoint resume technology, the machine can synchronize and resume playout immediately upon recovery without waiting for the next program. In the above example, when the failed machine is repaired at 10:10, it can immediately calculate the current timecode point of the broadcasting drama based on the playlist and current time, then synchronize and broadcast alongside the normal server. In this scenario, the remaining 35 minutes of the drama are broadcast in master-backup mode, whereas traditional methods would require single-machine broadcasting for this period.

## 2.4 Drag-and-Drop at Any Position

The embedded material manager enables editing of materials and broadcast items with simple drag-and-drop insertion at any position. A single material can be interrupted for insertion, enabling flexible playlist editing.

## 2.5 Support for Upstream/Downstream Matrix Reuse

A single matrix can function as both upstream matrix switching for selecting relay signals and downstream signal switching for PGM output. This provides an economical and flexible solution for simple 1-2 channel broadcasting operations.

## 2.6 True Playout-Control Separation

The system simultaneously supports both integrated and separated playout-control modes. In the separated mode, it employs unique network return transmission and picture return technology to enable real-time monitoring of server playout pictures at the control terminal. A single control terminal can manage one or multiple matrices. In extreme cases where the control terminal fails, the service terminal continues signal output unaffected, ensuring comprehensive broadcast security.

## 3. Typical Applications

Given that Manas Cable Television's HD signal transformation has not been fully completed—while urban areas have HD signal access, transmission remains SD—the station has implemented an HD (SD) four-channel solution tailored to local conditions. Manas Channel 1 and Channel 2 both broadcast in HD and

SD formats. Although this approach increases procurement costs, it completely ensures that both rural and urban viewers receive clear, stable television signals.

Currently, this playout system leverages advanced storage, networking, and video/audio codec technologies to reconstruct the station's broadcasting architecture and program preparation workflows. It has completed a comprehensive redesign of the broadcasting system architecture and business processes, meeting the requirements for high security, high reliability, high quality, high efficiency, and low-cost program broadcasting. This has inaugurated a new era in broadcasting system construction. This highly reliable, highly available, fully automatic, and intelligent playout system represents leading technical capabilities among county-level television stations across Xinjiang and holds significant promotional value.

**(Author Affiliation: Manas County Radio and Television Station, Xinjiang)**

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

*Source: ChinaXiv — Machine translation. Verify with original.*