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## Research Postprint Based on the Digital Television Center Media Asset Management System Platform

**Authors:** Wang Lingling

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### Abstract

Media serves as the carrier of content assets and embodies the development trend of transforming current audio-visual data management through digitalization, informatization, networking, and intelligentization. Its essence is to create content assets only once while managing all stages of media content, including acquisition, creation, processing, production, distribution services, and evaluation. In the new normal environment, the value chain is extended around this core, forming multi-dimensional management encompassing content aggregation and sharing, value-added utilization, and other aspects, while providing an increasing number of Web interface APIs and Web services to meet the requirements of user behavior systems.

### Full Text

#### Research on Digital Television Central Media Asset System Platform

**Abstract:** Media serves as the carrier of content assets, and the digitalization, informatization, networking, and intelligentization of audio-visual data management represent the current development trend. The fundamental principle is to create content assets once while managing all aspects of the media content life-cycle, including acquisition, creation, processing, production, distribution, and evaluation. In this new normal environment, the value chain extends around this core to enable multi-dimensional management of content aggregation, sharing, and value-added utilization. The system provides an increasing number of Web interfaces and Web services to accommodate diverse user behavior patterns.

**Keywords:** digital television; central media asset; platform research

## 1. Structure of Digital Television Central Media Asset System

The digital television central media asset system comprises seven subsystems: upload/download, cataloging and retrieval, high-definition/standard-definition packaging, backend services, core switching equipment, firewall, and on-line/nearline storage [Figure 1: see original paper]. These can be categorized into six functional components:

First, the upload/download subsystem consists of media asset upload/download workstations and peripheral equipment such as video recorders. Second, the cataloging and retrieval system comprises cataloging workstations and portal retrieval software. Third, the packaging center system is built around two high-definition/standard-definition packaging servers. Fourth, backend services include archive and retrieval services, migration and transcoding services, automatic technical review services, and user authentication services. Fifth, the storage system encompasses disk array storage and data stream tape libraries. Sixth, core switching equipment and firewalls consist of FC fiber channel switches, gigabit Ethernet switches, and corresponding firewall components.

## 2. Functional Characteristics of Digital Television Central Media Asset System

The digital television central media asset system employs various servers with distinct responsibilities and functions, as summarized in Table 1 and illustrated in Figure 1.

**Table 1. Functional Summary of Servers in Digital Television Central Media Asset System**

- **Upload/Download Workstations:** Handle data uploading and importing of multi-bitrate videos, as well as tape downloading and material exporting.
- **Cataloging and Retrieval Workstations:** Perform detailed indexing and entry of program metadata, supporting full-text search, parameter-based retrieval, and other query methods for program materials.
- **High-Definition/Standard-Definition Packaging System:** Serves as the core unit for packaging tasks, accepting assignments from the task scheduler.
- **Domain Controller/Database/Full-Text Retrieval Servers (Primary/Backup):** Manage the media asset system database, control system operations, and provide retrieval services.
- **MDC/Task Scheduling Servers (Primary/Backup):** Manage disk arrays, handle disk connections and mounting, and provide StorNext services.
- **Migration/Transcoding/Archive/Media Asset Management Servers:** Schedule and manage material migration, various bitrate

conversions, and archiving tasks.

- **Core Switching Equipment/Firewalls:** Provide virus protection and security for all system stations.

### 3.1 Four-Layer Software Architecture Model

The digital television central media asset system employs a four-layer architecture comprising the application layer, service layer, middleware layer, and data layer [Figure 2: see original paper].

**First, the Application Layer** includes both internal applications and external interfaces. Internal applications encompass the system's native media file management and processing services, including post-ingestion program and material processing, resource object cataloging, media file retrieval, download requests, and operational management services. External interfaces provide API services for external systems, including interfaces with news production systems and broadcast systems.

**Second, the Service Layer** includes archive scheduling services, transcoding services, automatic technical review services, and user authentication services. This layer provides data migration, storage, transcoding (low-bitrate generation), and other essential functions for various applications within the media asset system.

**Third, the Middleware Layer** includes streaming media publishing, workflow management, and FTP services. This layer provides a supporting platform that maintains connectivity between upper-layer applications and underlying systems.

**Fourth, the Data Layer** represents the storage tier, encompassing the underlying database platform, online and nearline storage management, storage media management, and storage file backup management.

### 3.2 Software Structure Design

The software structure design of the digital television central media asset system encompasses six categories: workflow engine support, workflow management, media asset system management console, unified user authentication management, cataloging and retrieval system customization, and support for other business operations.

**Workflow Engine Support:** The system supports multiple universal workflow engines while providing a built-in workflow engine specifically designed for media asset management. This application of workflow engines brings standardized and convenient workflow management to media asset structure management.

**Workflow Management:** This handles workflow tasks that arise during the interaction and data exchange between the media asset management system and other production and broadcast systems. Internal workflows and tasks among

various subsystems are coordinated through the workflow engine, which also enables system-wide monitoring of task execution status and progress. This allows for detailed workflow configuration and progress tracking of work tasks.

**Media Asset System Management Platform:** This provides a unified management platform tailored to the diverse functional management requirements of the media asset system. Through the management console, it achieves coordinated operation among different modules, enabling fully open, visualized, unified management of the entire media asset system. The platform can be customized according to different user requirements.

**Unified User Authentication Management:** During system operation, the media asset system inevitably interacts with other systems for data sharing, necessitating user authentication across platforms. The media asset system supports unified authentication while allowing internal configuration of different user permissions, resulting in varying login and usage rights.

**Cataloging and Retrieval System Customization:** This provides user-friendly customization tools that allow users to add, delete, or modify cataloging fields according to their needs without requiring any program changes. Through a graphical interface, users can complete all customization tasks for the cataloging system, with the flexibility to tailor the system to specific requirements.

**Support for Other Businesses:** The media asset system can readily support large-scale audio-visual archives, television station program storage centers, chief editor office management systems, news production business systems, broadcast systems, and DVB system content management platforms.

## 4. Conclusion

Media asset management involves the processing, archiving, indexing, and retrieval of media data. Traditional digital content management has been relatively simplistic. However, evolving societal demands require management of the entire media content lifecycle, including acquisition, creation, processing, production, distribution, and evaluation. Centered on this core, the extended value chain enables multi-dimensional management of content aggregation, sharing, and value-added utilization. Concurrently, under the convergence of new media, an increasing number of Web interfaces and Web services are being provided to implement user behavior systems.

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(Author Affiliation: Lianyungang Broadcasting and Television Station)

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

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