Total Nonlinear Editing Solution that Supports News Production Workflow

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Abstract

The role of broadcasting stations in news production workflow is primarily to promptly communicate accurate information. The changeover from tape media to file-based media usage, including that used in news coverage of on-air broadcasting can improve the workflow that used to impose a lengthy time longer than actual recording hours. In this paper, the authors also introduce a solution that makes news broadcasting more flexible and faster by the effective utilization of metadata.

Keywords

video server, Armadia, file-based, total nonlinear, news

1. Introduction

With the aim of making their workflow more efficient broadcasting stations and image-industry business undertakings are recently shifting from traditional linear equipment/systems based on videotapes to nonlinear equipment/systems based on files.

NEC is endeavoring to provide optimum solutions for the construction of file-based systems under the concept of solutions for broadcasters and image industry businesses with "Pro.Solution." File-based systems are regarded as key to the era of digital broadcasting. These solutions make full use of the broadcasting/image technologies that have been accumulated over nearly ninety years as well as of our state-of-the-art: digital, video server, network, computer and storage technologies. With regard to the news production workflow, we provide a total nonlinear solution that can make news broadcasting more flexible and quicker by the effective utilization of metadata.

2. Total Nonlinear System Requirements

The total nonlinear system implements an environment for quick and efficient news production and playout and can include the entire news job process from the management of materials to editing, playout and archiving. The key features of this system are as listed below.

(1) Immediacy

Essential for effective news production is the ability to record and edit gathered images in order to make them usable as broadcasting material as promptly as possible. In the process of recording, editing and playout, the advantages of a file-based system leads directly to the implementation of immediacy.

- **Recording**

Release from actual time constraints that has not previously been possible with baseband signal processing, and the capability of performing editing during recording.

- **Editing**

Ease and simplicity of editing (possibility of simultaneous editing by several persons, and of checking from any location that is accessible to the network).

- **Playout**

Possibility of playout completed packet materials by means of inter-server transfers and of the possibility of transmissions even during transfer.

However, from the perspective of system optimization, the arrangement of metadata is essential for the smooth utilization of images in news production. It is essential to implement immediacy based on the integrated management of images and metadata as shown in **Fig. 1** .

(2) Simplification of operations

The implementation of immediacy also requires an increase in the speed of flow of images in the system. The introduction of a total nonlinear system can rationalize the operation workflow, because the copy/transfer of files enables automation of the jobs that used to be performed man-

ually in the previous VTR-based operations. The file-based operation significantly improves operability because it enables work to be freed from restrictions that are imposed by location. Such streamlining of the operation flow can reduce human labor considerably and thereby lead to operational cost reductions.

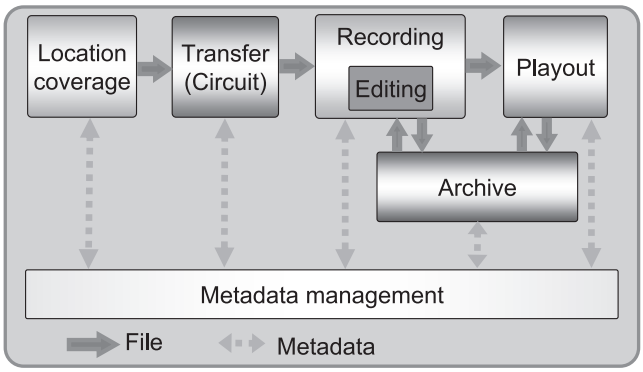

Fig. 1 Workflow of total nonlinear system.

(3) Reliability and maintainability

Since the total nonlinear system is a mission-critical system connected directly to the on-the-air operation, how to avoid stopping the overall flow even in the case of a fault becomes an important issue.

We believe that it is not an adequate solution to adopt traditional measures based on redundancy, but that it is also necessary to ensure availability under fault conditions and to provide maintainability without affecting the operation.

3. For the Implementation of Total Nonlinear Editing Systems

For realizing the total nonlinear news production systems, it is important to eliminate duplication of the metadata input jobs for immediacy and precision. The core of the total nonlinear

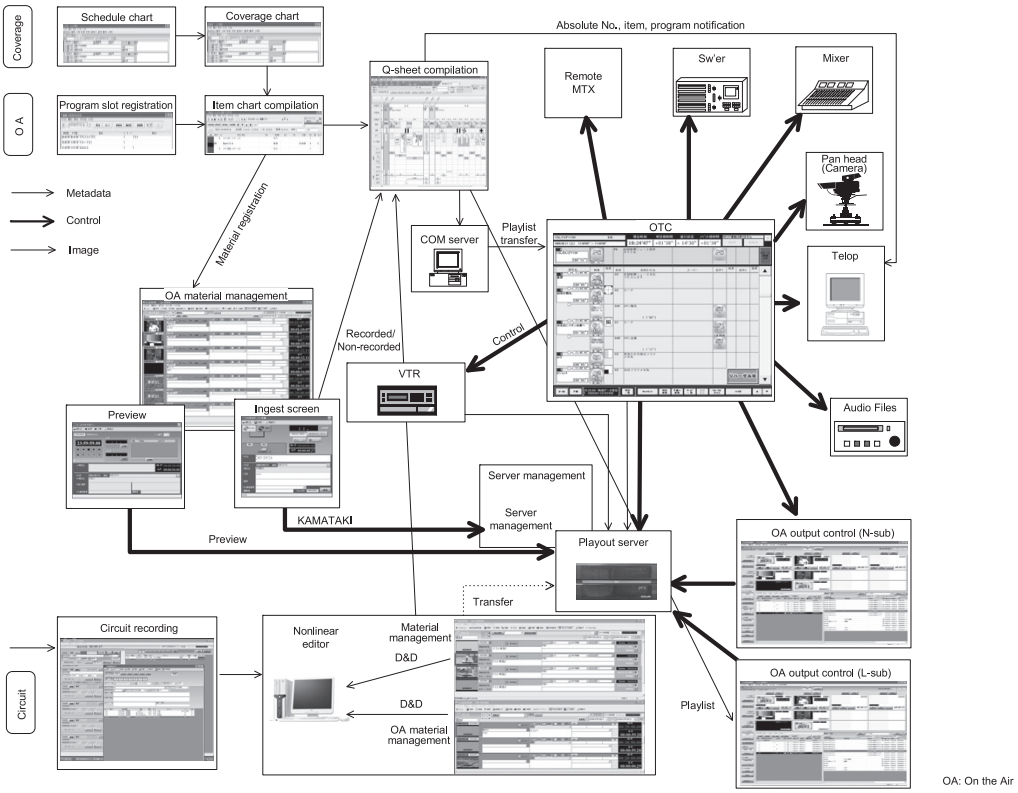

Fig. 2 News system workflow.

system is the video server. The video server is a critical component for converting the traditional VTR-based baseband signals into files, for converting files into baseband signals and for exchanging files via a network. In the workflow of news production, video servers are used in the recording and transmission steps, and playout is thereby enabled during recording and on-air operation. This is achieved via a simplified procedure without the need for manual input, such as videotape loading. We review the points in the implementation of a total nonlinear system in the following subsections.

3.1 Workflow

Due to a consistent metadata management capability NEC is capable of performing total management of the workflow from newsgathering to editing and playout. **Fig. 2** shows an example of the workflow of a news system.

Fusion of the news support system, that assists the news coverage schedule and program item chart, and the total nonlinear system enables to eliminate double entries of metadata and to thereby improve both labor saving and accuracy.

Exchange of metadata between editors of different systems enables material exchanges without the need for complicated metadata input work via each editor.

In addition, IT technologies such as network, computer and storage technologies can significantly reduce the time that used to be required to perform tasks, including the time taken for editing, material copying and file transfer.

3.2 Video Server "Armadia"

(1) Affinity with adjacent equipment and systems

The codec formats used in the present file-based system include the MPEG-2 format as well as the newer AVC-Intra format. NEC's Armadia video server has previously been supporting the MPEG-2 format but will also soon be compatible with the AVC-Intra format.

Such compatibility will considerably improve the affinity with adjacent equipment and systems. For example, in the exchange of files with a nonlinear editor used as a peripheral device to a video server, the images can be played in the original format without the need for a codec format conversion (transcoding). This is achieved by using the file transfer of the MXF (Material eXchange format) that is the standard for inter-equipment data handling. This means that the affinity with adjacent equipment and systems can be improved considerably.

(2) High reliability

With Armadia, we developed our own file system software so that each of the HDDs/SSDs can offer the best performance. The system uses a fast-response disk array controller tuned exclusively for video recording/playback that ensures the broad bandwidth essential for real-time video processing and fast response with a guarantee against delay. The real-time video is processed with dedicated hardware so that the storage and networks can be configured as open systems by reducing the IT-system loads. The result achieves excellent extendibility thanks to the possibility of utilizing a variety of open resources.

(3) Abundant accessory functions

Armadia offers various functions that can serve the various usage workflow of a file-based system. For example, the subtitle data replacement function enables coupling of auxiliary signals that have increased in importance following the dissemination of file-based operations, such as subtitle data, in the form of files. Other functions include: one that plays different materials successively from the same output port, the input stage FS (Frame Synchronizer) function that enables stable recording of various resource signals, and a function that can operate in a system with a mixed presence of SD (Standard Definition) and HD (High Definition) files in order to output SD files after upconverting them into HD files.

3.3 Various Support Functions

The functions listed below may be required in the various news production scenarios. As shown in **Fig. 3** . NEC is capable of constructing systems using element technologies for each of these functions.

(1) File quality check

The recorded or transported materials have usually been checked visually by playing them on a video recorder. On the other hand, the file check function can check the standards and formats of materials and detect abnormalities including muted portions and black frames.

(2) Face recognition/person identification technology

This function identifies persons by retrieving their faces from image data. It supports preparation of a list of characteristics as well as playback of associated images.

(3) Search engine

This function introduces fuzzy search to improve the hit ratio in searches of past materials and supports reuse of materials with fast searches.

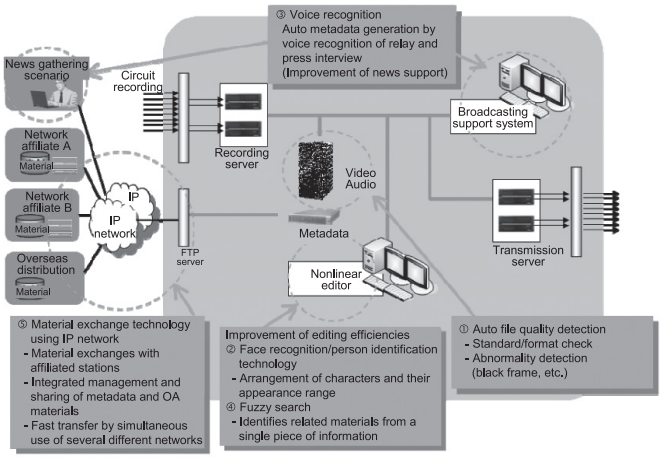

Fig. 3 Element Technologies Required for Future News Production Scenarios

(4) Voice recognition engine

This function supports preparation of news script by turning the voices in a press interview sequentially into text.

(5) Materials exchange

This function supports transfer using several IP networks so that file-based materials can be exchanged more stably between stations.

4. Conclusion

NEC has developed the Armadia video server that achieves both high reliability and fast response as the core product for the total nonlinear systems for news production and broadcasting. The total nonlinear systems built with Armadia by emphasizing metadata have already been adopted by many broadcasting stations and other customers in the image industry. In the future, we aim to continue to respond to the expectations of a wide range of customers by promoting file-based systems featuring improved usability.

*AVC-Intra is a trademark of Panasonic Corporation.

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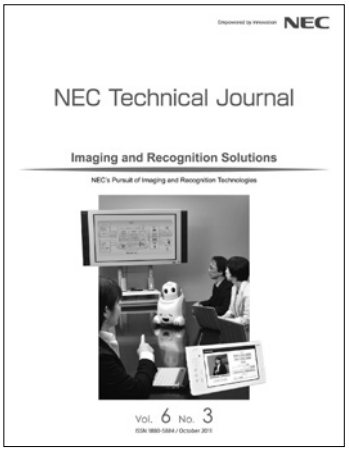

Vol.6 No.3
October, 2011

Special Issue TOP