APPLICATION NOTE
Rev March 2007

MAP*review* in Government and Parliamentary Video Library Applications

Executive Summary

Today, a number of government and parliamentary institutions are seeking comprehensive, cost-effective solutions that provide their members with timely access to information resources such as broadcast news content, parliamentary/congressional sessions, current affairs programs, and archives. These members require prompt access to accurate information in order to quickly respond to issues of the day that are covered by news and current affairs media. These institutions are seeking digital solutions that replace cumbersome, time-consuming handling of tape with faster, easier digital access to media.

This application note is based on a real system that was designed for a major user. It outlines a detailed digital solution for the capture, organization, delivery, replay and archiving of video and audio programs. It is based on Telestream's new media workflow automation product called MAP*review*. This network-based enterprise software solution provides the convenience of multichannel media recording, organization and viewing – all in one easy-to-use application.

MAP*review* Highlights

- Encodes/stores media in Microsoft Windows Media 9 Series format according to administrator-defined schedules. This format provides much higher quality than MPEG-2 for any given bit rate, thus allowing lower data rates to be used which minimizes storage costs and network impact.
- View/monitor one or more live or stored feeds from any networked desktop during and after acquisition
- Intuitive desktop access to organize, search, view and share media across the facility
- Automatic metadata extraction and indexing facilitates easy search on file name, time/date, closed caption text, and key words
- Clip and flip media to other formats & bit rates for publishing to the Web or sharing with colleagues & clients (supports Windows Media, Real and QuickTime)
- Auto archive to DVD or storage library, based on user defined expiration rules

Because MAP*review* utilizes multiple Microsoft technologies, XML and industry standard file transfer methods, this solution is extremely cost effective and scalable. And, because of the integration with Microsoft technologies, it provides simple plug-and-play compatibility with a broad range of third party products and applications. For instance, Telestream has integrated the Windows Speech API so that customers can plug in whatever speech-to-text engines they want, as long as they support this API as well. Similarly, Telestream has integrated the Removable Storage Manager (RSM) which allows libraries of removable media to be attached easily. By tying the architecture so closely to Windows, the solution facilitates simple integration of customer selected, best-of-breed modules, thus lowering the overall cost of large media systems by orders of magnitude. What used to be customizable is now configurable.

Why Choose Telestream

Telestream opened its doors in 1998 and has been enhancing and shipping new media encoding and workflow automation products ever since. Telestream products have set the standard with the world's leading media and entertainment companies, corporations and government institutions for the encoding and delivery of media over IP networks. Customers such as ABC, BBC, CNN, Disney, and numerous branches of the US government rely on Telestream for convenient, cost-effective, and robust digital media acquisition and exchange. Telestream's passion is to ensure its customers are extremely satisfied. They have relied on this satisfaction to receive volumes of follow-on business from same customers and enthusiastic referrals to new ones. Telestream ensures customer satisfaction through well-trained sales partners, diligent support and extremely responsive engineering investigation and fixes to problems that arise.

MAP*review* Product Description

Telestream's new workflow automation solution provides the convenience of multichannel media recording, organization and viewing—all in one easy-to-use application. This multipurpose tool is equally useful for a variety of broadcast, cable, government and corporate applications.

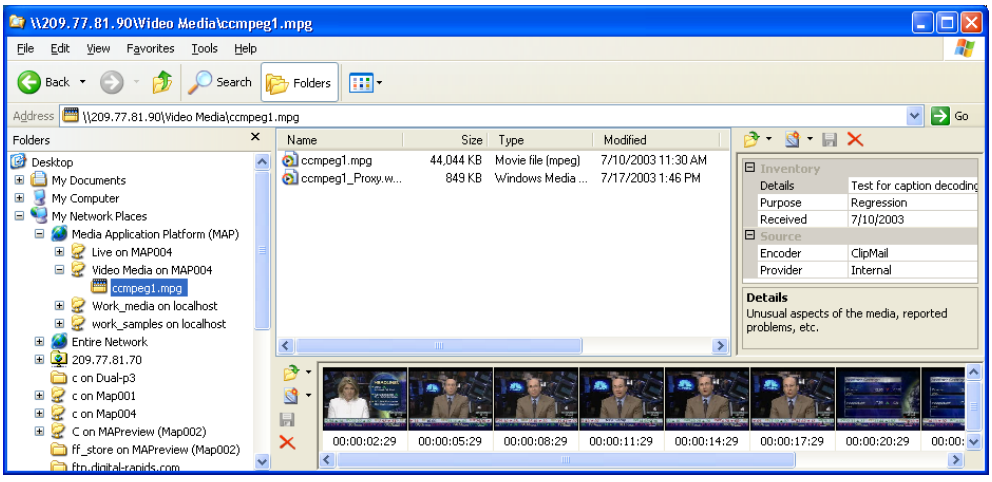
MAP*review*™ is built on Telestream's powerful new Media Application Platform (MAP), which utilizes XML and multiple Microsoft technologies to provide powerful scalability and access to a wide range of third party applications, while minimizing system costs. Media are encoded and stored in Windows Media 9 format, providing up to broadcast quality or higher with greater storage efficiency than MPEG-2 or other digital formats. Extensions to the familiar Windows Explorer navigation structure allow users to organize and search media files, just as if they were standard documents. Media can be exported, shared, transcoded or archived with drag-and-drop simplicity between folders in the MAP directory.

Transcoding within MAP utilizes the powerful technology that has been (and continues to be) developed for FlipFactory, Telestream's industry renowned media transcoding and delivery application. This technology provides access to a wide range of formats, edit systems, broadcast servers, streaming servers, etc. MAP*review* becomes "format agnostic," allowing a user, for instance, to save a file from an edit system into a MAP directory which would automatically generate the encoding of a WM9 version as well as the metadata extraction rules associated with that directory.

Based on preset schedules, MAP*review* automatically records one or more live video feeds. These could be feeds of a debate from the house floor or a network news broadcast. Windows Media encoding parameters such as bit rate, frame rate, frame size, etc can be set on a per-channel or per-program basis. Metadata such as closed captioning, timecode, keyframes, and labels are captured during ingest to enable searching. Third-party applications can insert additional metadata through simple XML plug-ins.

Plus, users can re-purpose stored content by trimming, exporting still frames, and flipping to other formats for Web publishing or exchange with other systems.

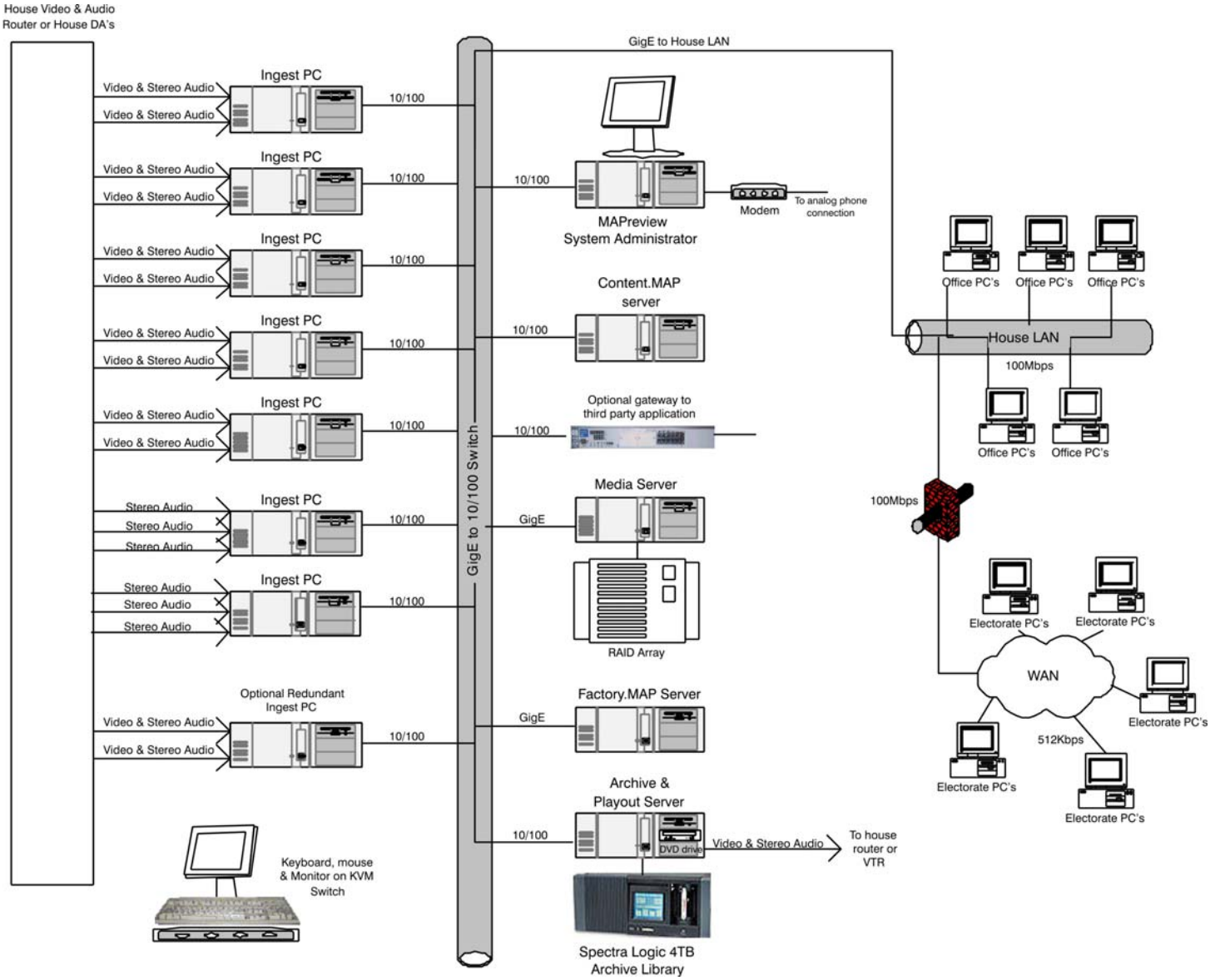
The Explorer.MAP user interface is really just an extension to the Windows workspace – extending the convenience of Windows Explorer search capabilities to complex media files. In addition, by associating media formats and metadata requirements with folders within the MAP directory, tasks such as repurposing, exchanging and archiving media can all be accomplished with drag-and-drop simplicity. Also, because the interface is tied so closely to Windows, when browsing files within, say an editing application, the user can view all the rich metadata available for each file (as displayed in the sample screenshot below). This ensures faster and more accurate selection of source material.



System Proposal for a Government or Parliamentary Video Library Application

Below is a system diagram that provides an overall view of the proposed system solution. It is followed by a listing of the system requirements as specified by our real *sample* user. Following the requirements, we provide a brief description of the individual system components required for this particular *sample* application.

System Architecture for Sample Government or Parliamentary Digital Video and Audio Project



Example System Requirements

System requirements specified by our real *sample* user:

Network Connectivity: Gigabit central server connectivity; 100Mbps to the desktop; 512kbps to remote sites

Capture: Simultaneous capture of 10 video and 6 audio channels, scalable up to 15 video and 10 audio channels

Users: 40 users at the same time, scalable up to 100 users

Storage: 320 video hours and 240 audio hours = 80 GByte on-line storage
138 video hours and 50 audio hours = 33 GByte archived near-line storage every two weeks
3600 hours = 850 GByte near-line archive storage per year

System components required for this *sample* large government/parliament application.

Telestream MAP*review* Software Components

Capture.MAP

This service controls capture devices (i.e. capture cards) and captures media according to the Capture.MAP schedule. The Capture Administrator allows the user to set up capture schedules and secure format parameters such as bit rate, frame size, etc.

Content.MAP

The Content.MAP server is the heart of the MAP*review* system. It organizes all of the media and associated metadata. It can be configured with rules to enact various processes such as delivery, transcoding, expiration, access rights, metadata generation and media indexing. This service handles all the textual and track metadata searching. Depending on your configuration, the Content.MAP service can be installed on the Capture.MAP server or on a separate server.

Telestream recommends a separate Content.MAP server for large applications, e.g. those requiring a large number of capture services (now or for future expansion) as well as a large number of potential concurrent clients.

Factory.MAP

The Factory.MAP service runs the transcoding software. As with the Content.MAP service, it can be installed on the Capture.MAP server depending on the CPU utilization required. This service supports transcoding to Windows Media (e.g. bit rate conversions), Real, and QuickTime.

Archive.MAP

The Archive.MAP service provides for the archiving of the Content.MAP directory including any associated metadata and the media files. Archival is an ongoing process based on the rules set up within Content.MAP. The default device for MAP archive is DVD. Additional archive methods are available based on Microsoft's Removable Storage Manager. Telestream recommends that the Archive.MAP service be installed on the same server as the single playout video card, as these applications are not time critical for the operation of the network.

Explorer.MAP Client/Quick Review Client

The Explorer.MAP client software, including the Quick Review Client app, runs on any Windows 2000 or Windows XP based computer on the MAP network. It allows the user to search, move, trim and view content in the Content.MAP directory from any computer on the network. For optimal performance for the user interface, a minimum 1.6 GHz CPU is recommended.

MAP.Player

Telestream's MAP Player is a media player based on Windows Media Player. Features include direct metadata searching on tracks, single-frame stepping (forward and backward), jump to time code, and mark-in/mark-out/save new clip.

Hardware Components

Server(s)

MAP*review* can be configured on a standalone server or with separate components running on separate servers. For example, a dual processor 2.8 GHz Xeon system can handle up to four captures at lower resolutions and two captures at higher resolutions and operate the Content.MAP service with limited Factory.MAP transcoding service.

For higher bit rate encoding, a high level of transcoding, and/or when more than five clients are required, Telestream recommends that the software components (Capture, Content and Factory) be installed on separate servers.

For this example, Telestream would recommend separate ingest servers for each pair of video capture cards and three audio cards. And, as identified above, Telestream would recommend placing the key applications on separate servers.

All servers included in this proposal are rack mount and include the operating system license and appropriate RAM and drives.

Storage

The size of the storage needs to be based on the compression levels captured, the number of channels and, of course, how long the material is required on spinning disk.

As an example, for a single channel recording

WM9 Encoding Bit Rate	Approx Storage Consumption
200kbps	2.2 GB/day
500kbps	5.5 GB/day
700kbps	7.8 GB/day
1 Mbps	11 GB/day

This system would typically include a high speed RAID based drive subsystem connected to the media server via fibre-channel I/O. This provides the bandwidth required to service all current and reported expansion capture ports and proposed client playout ports.

Based on the expected usage data, and a capture rate for video at up to 500kbps and audio at 24kbps, this storage array will hold more than 21 days of material online.

Capture Cards

In order to support industry standards, off-the-shelf Osprey brand capture cards are used. The proposed cards would have composite NTSC/PAL video BNC inputs and XLR audio inputs. These are considered the demarcation points for the video and audio ingest. SDI video is available should users require it.

Playout Card

In order to support industry standards, an off-the-shelf broadcast AV card is used. It would have composite NTSC or PAL video and stereo audio outputs. SDI video is available should users require it.

Networking Infrastructure

The system obviously requires a fast and clean networking infrastructure. Therefore, this proposal includes a HP Procurve Gigabit switch (or equivalent) with 10/100 ports and 100/1000 ports as required. It is recommended to have GigE connectivity to the House LAN. A port is provided in the switch for such a connection. Note that this is considered the demarcation point for the IT I/O.

Archive Library

Data tape was specified by this sample customer, which is supported in addition to the DVD option. Therefore, this proposal includes a Spectra Logic AIT3 (or equivalent) based data library connected to the Archive server via SCSI and operating under the Microsoft Removable Storage Manager. This library will hold “near-line” 4TByte of data, which is more than three years of archived media. A second library can be added, if required, at a later time, or tapes in the library can be removed and stored for “off-line archive.” (FYI, a full Spectra 10K complement of 40 tapes will fit in a drawer of an average desk)

Should users wish to limit archive costs in the short term, this library can be offered with 20 slots and tapes. An additional 20 slots can be added, via a software upgrade, as they are required.

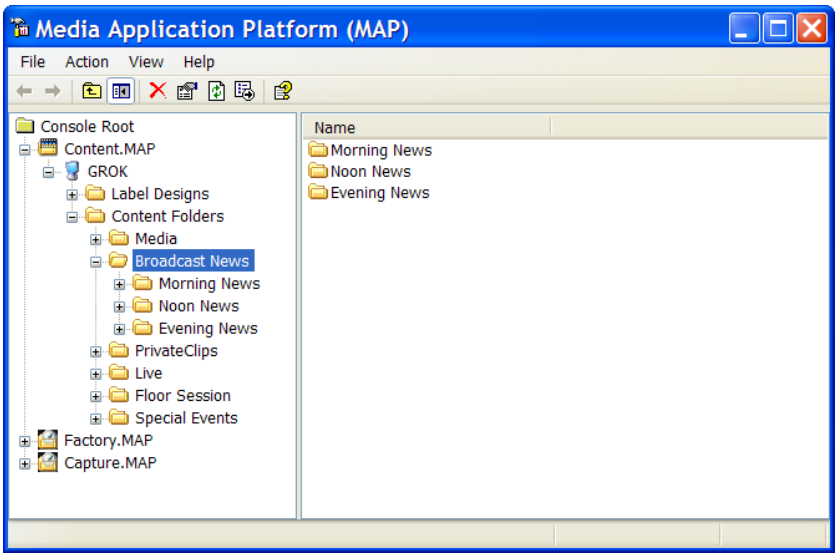
Using Spectra Logic's Bullfrog architecture, the 10K is the baby of the Spectra Logic data protection suite of broadcast-ready products. It supports up to 40 Sony AIT tapes and one to four AIT3 drives in just 18cm of rack space. Split the library in two for sharing of resources between different servers or control systems.

General Infrastructure

As all the components are rack mounted, they will reside in standard 19-inch equipment racks with all servers – except the System Administrator, having a shared keyboard, monitor and mouse via a supplied KVM switch. The System Administrator server would have its own keyboard, monitor and mouse.

A User Scenario -- Accessing Media

The systems administrator has defined content folders within MAP, organized via type of content and date.



Users (clients) can navigate through the directory structure to find the content type and date they want to view. Alternatively, users can use the Search function in Windows Explorer to search on labels that would have been entered at the time of capture, e.g. "Seat Belt Law." Or users can search on more generic terms that might be found in the closed captioning text, e.g. "Alabama."

Users would be able to view content that is actively being recorded or that is available on-line. Simply selecting the desired file presents the label metadata and thumbnail pictures or other temporal metadata. These “guides” ensure that the selected content is the one the user really wants to watch. Using the MAP Player, users can play directly from a selected point in time in the middle of a clip, such as a specific thumbnail or from a “found” key word, without having to play a clip from the beginning.

If the desired content is in the near-line storage library, users will be informed that the content is being fetched and will be available shortly. Similarly, if the content is on an off-line tape, an administrator will need to be notified to fetch the tape from the off-line storage.

Implementation Considerations

Local and Remote Access

Remote users will likely need lower bit-rate versions of the content which is being viewed on the LAN. This can be achieved in a couple of ways. One way is to capture the content up front in a “dual encode” mode at two bit rates. The Osprey 220 capture card, for instance, supports this capability. The scheduling application can be used to identify which programs or sessions should be recorded at which dual bit rates, and which should be encoded at single bit rates.

A second alternative would be to transcode some (or all) programs or sessions into lower bit rates. This can be easily accomplished via folder definitions in MAP*review*. Content written into folders with the “transcode to lower bit rate” parameter set would be transcoded and made available to remote users.

A third alternative, which could be utilized with either of the first two options, is to transcode requested clips at the time they are requested. With this approach, only the most “popular” content would be dual encoded or transcoded immediately, and other content would be automatically transcoded when a user requests a clip.

Windows Media Server

Now part of Windows Server 2003, Windows Media Server is utilized to stream the content to users' desktops. Whether viewing live or stored/on-demand content, Windows Media Server provides the connectivity and robust scalability to allow dozens or hundreds of clients to view their media.

Management and Reporting

Both MAP*review* and Windows Server 2003 provide APIs which can be utilized by third party or in-house database programmers to extract and present capture statistics and logs (MAP*review*), or viewing patterns and statistics (Windows Media Server).

NOTE: see Telestream Website for current details.

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