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The Seven Network: An integrated production and playout system

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Australian commercial television company The Seven Network operates out of Melbourne, Sydney, Brisbane, Adelaide and Perth with local playout facilities at each. Aging 1-inch C technology and an increasingly uncomfortable Melbourne facility building built the basis for The Seven Network's decision to create a largely tapeless studio, production and centralized playout complex incorporating file transfer technologies and workflow management.

Also, The Seven Network wanted a backup system to be installed at its Sydney site as a result of the centralized playout. All sites should be linked with an MPEG-2 infrastructure, based on its existing 'DVN' network (Telstra). By moving to an MPEG-2-based solution, The Seven Network could greatly enhance its distribution and contribution networks without incurring additional circuit revenue costs. Together with the Thomson Multimedia Systems Group as integrator, the project began in 2001.

The Seven Network facility in Melbourne, Australia, houses the advanced technology required to broadcast 20 television feeds to all five of its capital city stations — Melbourne, Sydney, Brisbane, Adelaide and Perth.

Phase 1

The project started with the installation of an automated, server-based centralized playout system serving the markets of Melbourne, Sydney, Brisbane, Adelaide and Perth across three time zones. The playout system needed to be tightly integrated with the production processes. The type of servers used in this particular environment must support playout on all channels, while offering a significant amount of guaranteed bandwidth for faster than real-time file transfers and the servers must be capable of supporting editing. The news system consists of one Quantel Power server (five edit seats) and one Quantel Studio server, which provides backup for transmission-ready items. Browse material is held on IBIS browse servers, which incorporate Telemedia encoders. Power servers are used for program production, and Studio servers for playout, which are capable of fulfilling all requirements for Seven Network's Broadcast Centre Melbourne (BCM). All Quantel servers operate with MPEG-2 4:2:2 Main Level 50i frame-only compression to maintain quality and to allow seamless file transfers between servers without the need for transcoding.

The video and audio routing infrastructure is based on Thomson SD/HD Venus routers, with Thomson Jupiter control system and control panels. A 256x256 Venus A/V router is in use for the majority of production and external sources, and a dedicated 128x128 transmission router carries presentation-specific sources.

For redundancy/emergency issues, an additional 96x32 transmission router is installed. All SD routers are serial digital video (SDV) with separate AES audio levels. In the case of the facility

router, two levels of AES are incorporated, which carry conventional AES and Dolby E for multichannel production. For HD, playout is a separate 16x16 HD router in operation with associated 2-level AES routing. Snell & Wilcox equipment is used for distribution and signal processing (IQ range). The cards are monitored via RollCall, a centralized alarm and control system for IQ equipment, allowing MCR staff to monitor and adjust parameters.

The presentation video system runs Thomson Saturn switchers with associated single-channel DVE's and Pinnacle Deko still stores. The Saturn presentation switchers have access to the main facility and transmission router. Each Saturn control panel is capable of controlling up to 15 sets of presentation switcher electronics. This feature is used to allow all the markets to be controlled from a single presentation suite, or for individual markets to be assigned to any one of four associated 'breakaway' presentation suites.

Assignment is made by a single button press on the local Saturn switcher control panel, which assigns the appropriate control electronics and switches the relevant video/audio feeds and under monitor displays to the breakaway suite.

The Seven Network currently operates five geographically separate markets, so the presentation system has to be capable of producing two aspect ratios (4:3/16:9) per market on the SD service, plus an HD service and a 'clean feed' SD service for use by affiliates. These various outputs require for each presentation channel aspect ratio conversion, bug generation according to aspect ratio, data insertion, cut to black switching for clean feeds, voice over insertion and up-conversion to HD for non-HD material. With the exception of the 'clean feed' services, all programs contain

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subtitles originating as 'live' subtitles (subtitling units in Sydney and Perth), or as offtape subtitles (within the VBI), or as subtitle files previously loaded onto a subtitle server. Subtitle sources are automatically selected according to the transmission schedule. Currently, bitmap subtitles for the DVB services are not used.

The Seven Network uses a Thomson automation system that comprises automation and backup automation computers, together with a cache computer and a media manager, connected on a single data LAN. Device control runs via Thomson's MSL servers, connected together on a single control LAN. It allows any automation channel to control any device, while distributing the processing power to facilitate frame accuracy for all events. Each automation computer at the Melbourne installation (one for each market) can run 15 simultaneous automation channels. The automation systems are configured to accept next event 'cue' and 'play' commands from the remote sites. This allows the news director in a remote site to manually trigger the commercial break within his program, without intervention from the presentation director. The system incorporates suitable interlocks to prevent inadvertent operation.

First, media is checked for technical quality and then recorded into the system at one of six ingest stations. Each station has access to 17 VTRs, two 'Dubsat' (Australian system for commercial distribution as media files) commercial server outputs and incoming lines via routers. VTRs can be remote-controlled by HiTech VTR controllers via Venus 422 Router. Long-form material (program) is recorded in parallel into two of the Quantel Studio Transmission servers, while short-form material (commercials) goes in parallel into the other two studio servers using either the Thomson automation dub station software, or using previously generated cache lists from the Thomson automation cache manager. This ensures mirroring and separation of long- and short-form material. Three days of programs and the majority of commercial material can be kept online. HD material is recorded into the HD server, and simultaneously downconverted copies are recorded into the appropriate SD servers.

A Thomson automation system controls the playout, which receives schedules from the existing Seven Network NTS scheduling system. The system constantly looks ahead for missing material, alerting the operator when problems are found. When media exists only in SD form, the SD signal is up-converted. When media exists in HD form, the HD service is fed from the HD server, and the SD service is fed from the down-converted copies on the SD server.

Sydney backup

The backup playout system is essentially a simplified version of the main system in Melbourne. It does not support HD playout, and it has a single long-form and a single short-form server. The backup system needed to connect to the Thomson automation systems across a WAN to act as a single multi-site automation system. The flexibility within the automation architecture compensates delays created by the MPEG-2 encoders on the video circuits between the two sites. The Melbourne or Sydney automation computers can playback/record material from/to servers or VTRs — located on either site — frame accurately.

The media management computer within the automation topology contains media lists for the media on both sites. While transmission schedules are downloaded to the automation systems in Melbourne, cache lists are created based on those schedules. These cache lists also run in Melbourne and cause appropriate media on the Melbourne servers to be recorded to the Sydney servers. This ensures that the Sydney servers contain only media that is needed. Only device names are automatically changed during the normal list processing prior to the schedules being loaded. This permits Sydney to run in full backup mode, mirroring the Melbourne output.

Melbourne news system

The Seven Network uses DVCPRO tape format for news gathering. Until recently, as an entirely tape-based organization, it had no experience with automated news preparation and production, although it has had some experience with Newstar. All Newstar journalist workstations have been upgraded to iNews, and combined with IBIS browse screens to enable journalists to browse news material at their desktops and to perform simple desktop editing of the browse material.

A news ingest area with six ingest positions can technically monitor the material for quality. During the ingest process, the operator inputs relevant metadata, which is stored in an SQL IBIS database (ServerBase). The ServerBase server acts as the main database for the Clipbox Power, Clipbox Studio and the Browse servers. One ingest position is also equipped with an automated archive capability, which creates archive tapes of clips resident on the server, that have been aired. Additionally, one ingest position also incorporates a 'Flash' panel, which is used for manual archiving of non-transmitted material. The Flash panel resembles a conventional VTR panel and can control a VTR as a source and a Clipbox port as a destination, or vice versa.

The newsroom system is a network of 40 workstations running iNews software. Journalists can access clips that are available on the Quantel servers and on the corresponding browse servers. Ten out of the 40 seats can view in parallel the available browse material using IBIS Vista Browse. A further 10 seats can browse and create a simple edit decision lists (EDLs) using IBIS Clip Trim. This EDL is transferred to the Quantel Clipbox Power for conform or final editing purposes. Once a clip is ready for transmission, it is automatically copied as file transfer from the Power to the Studio server. All final material is added to a rundown list, which includes information related to the news material such as server-based items, stills and prompt information. The rundown is integrated with the iNews Broadcast Control System (BCS) that interfaces with controlled broadcast devices.

The news control room incorporates Thomson DD35 vision mixer together with 2-channel Extreme DVE, Lightning still store and FX Deko CG. A Euphonics series 5 audio desk provides multichannel audio capability. The director controls the vision mixer and manually runs the

InterCart hardware control panel to play clips to air. The assistant can control the caption generator and the stillstore via the BCS keyboard. By preference, every event is manually triggered by its local panel, although the BCS can be configured to trigger some events automatically, as part of the rundown sequence.

Final phase

The final phase, scheduled for February 2003, will include the introduction of a data tape archive and tapeless news operation at all other sites, widespread use of media file transfer within and workflow management across the production processes, browse manipulation of all production material, and further development of server-based production within the Melbourne site.

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