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Networking NPR West

by Mel Lambert

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National Public Radio, headquartered in Washington, D.C., needs little introduction. Established in 1970, NPR has grown during the past three decades to become a well-respected multimedia outlet employing more than 700 reporters, producers, editors, and online and administrative staff. Today, NPR programming airs on 709 radio stations operated by close to 300 member organizations. At a time when many news companies are reducing operations, NPR News has expanded and today extends over foreign and domestic bureaus.

But until earlier this year, an important part of the jigsaw was missing: NPR lacked a substantial presence on the West Coast. "Given the importance of the West Coast as a news source," says Bud Aiello, NPR's director of engineering technology, "we realized that a full-service facility was required within the Los Angeles area."

A building was located in Culver City, just south of Los Angeles, in a space that recently housed an Internet video production and teleconferencing firm. It came complete with production suites, support systems and technical build-out. The presence of an existing technical infrastructure that included a high-power UPS, large-capacity AC, generator transfer switch, a central facilities room and provision for satellite dishes dramatically streamlined the conversion for radio production.

"Because this building already offered a number of areas that we could modify for production and broadcasting, we could save a large amount of money," notes Aiello. The 25,000-square-foot facility is the first large-scale production center NPR has established outside of Washington, D.C. Eventually, NPR West will house a staff of 90, including a Los Angeles News Bureau. It opened officially on November 2, 2002, just in time for coast-to-coast coverage of the fall elections. Reported cost for the NPR West project, including the \$8 million purchase of land and a two-building facility, was \$13 million.

As NPR's second-largest facility, NPR West also provides backup to the network, which produces, acquires and distributes some 120 hours of programming a week to stations around the U.S. "September 11th made it apparent in a very urgent way that we need another facility that could keep NPR going if something devastating happens in Washington," says Jay Kernis, NPR's senior VP for programming.

DESIGN AND MODIFICATIONS

The new complex comprises five self-contained production suites, plus two on-air studios with companion control rooms. A central Technical Center links all of the areas via control and audio data networks, and provides access to incoming and outgoing satellite and related circuits to Washington and other locations, as necessary. (A 40 x 40-foot area with associated control room is currently under consideration for use as a large recording studio or video production stage.) Architectural design for the conversion project was by studio bau:ton of Los Angeles, with principal Peter Grueneisen serving as lead architect/acoustical designer and Charles Irving as project manager. Virginia-based TGS Inc. provided system design and integration services.

According to Grueneisen, "[NPR's] architectural plan called for serious acoustical improvements, which were accomplished with floating floors and new, heavy room shells in the two larger studios and with isolation cuts in the slab around the smaller rooms. Although the layout of the building did not need substantial changes, the rooms essentially had to be rebuilt." To provide enhanced sound isolation within the three edit suites and pair of production areas, modular, prefabricated broadcast booths from Wenger Corporation were assembled inside the existing areas.

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“For the larger control rooms and on-air studios, we decided to raise and float the concrete slabs,” adds Irving. “For acoustical room treatments, we used three products that were selected for their economy — not only as material, but also for ease of installation. **On the walls, we used a combination of *Echo Eliminator™*, which is a fiberglass-free material produced from recycled cotton, and *Sound Silencer™*** (For more information on these and other acoustical products contact Acoustical Surfaces Inc. 1-800-448-0121 website: www.acousticalsurfaces.com e-mail: sales@acousticalsurfaces.com.) These panels were either bonded directly to the gypsum board surfaces or, where we needed to cover acoustic wall and ceiling cavities, we employed a system of wire-mesh backing or exposed wood battens. On the ceilings, we specified a combination of Sound Silencer™ and Sonex, using similar attachment methods.” Acoustical Surfaces Inc. supplied the Echo Eliminator™ and Sound Silencer™ products, plus Sonex. TGS Inc. supplied the various studio desks and control room furniture.

In terms of the new facility’s production equipment, NPR went with what it had in Washington and New York: Dalet Digital Media Systems networked hard disk editors and asset-management systems, and the Klotz VADIS II Audio Network, with a variety of control surfaces tailored to the specific needs of each production and on-air studio. This way, staff can move freely between these locations and control of critical functions can happen remotely.

High-speed DS3-level connections to Washington provides wide area networking of the Dalet playback and Klotz routing systems, in addition to enabling real-time digital audio transfers. “A reporter will be able to enter [NPR West’s] Production 4 or 5 and have a technician in D.C. handle the interconnect from 3,000 miles way,” Aiello explains. “A total of nine MPEG Layer-2 [data-compression] codecs operating at 384 kbits connect [NPR West] to Washington. Codecs 1 through 4 are normaled to the stereo outputs from the main on-air studios A, B and C [A is currently under consideration], plus the Tech Center. The remaining five ports are used for various mono/stereo feeds.” At the Washington, D.C., facility, the outputs from NPR West’s studios and Technical Center appear as dedicated inputs on the routing switcher, which connects to the facility’s various production areas and satellite distribution network.

The use of close to 60 Dalet workstations for audio recording, playback and asset management, plus eight Klotz digital consoles for level control and routing, dramatically streamlines the networking process. Dalet playback ports are normaled digitally to Klotz inputs, and outputs are routed to recorder inputs; various system topologies have been developed to let radio journalists run the five production suites by themselves, while conventional operators are used in the large-format studios.

“We designed the five production suites so that reporters and producers could handle everything from a central, self-contained location,” Aiello explains. “Suites 4 and 5 are slightly different since they also house a Telos Zephyr system that can feed material directly to Washington, for example, via a [bidirectional] ISDN network connection. In this way, we can also go live to the network from any of these rooms, if necessary.”

DIGITAL CONTROL SURFACES

NPR West's Klotz digital mixing engines comprise a series of DCII Control Surfaces linked via high-speed Ethernet LANs connected to VADIS (Variable Audio-Distribution Interface System) processing cores and routers located in a number of technical areas throughout the complex. “NPR West’s central mainframe houses the VADIS 880 DSP controller/router that handles assignment of the control surface’s various shaft encoders and programmable switches,” says Karl Schoning, Klotz’s director of engineering, adding that the system is configured with a number of mic preamps, analog inputs, AES/EBU and S/PDIF digital inputs, MADI, ADAT optical, RS232/422 serial control and other ports.

“By creating a two-layered system in VADIS, we have separated audio from control,” stresses Klotz project leader Jonathan Burtner. This configuration allows for the routing of logic/machine control information, audio signals, serial information, program-associated data information and digital sync, while eliminating approximately 90% of traditional inter-room cabling. “And our TDM [Time Division Multiplex technology] has allowed us to design a system with scalable DSP that results in an unlimited bus structure.”

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While audio is distributed from one VADIS frame to another via fiber-optic cables, logic/machine control information travels over a closed Ethernet-based LAN between individual consoles so that operators can create a customized logic control topology. VADIS frames and controller engines can be located remotely or in the same room as the DCII surface, or both, depending on the user's requirements. The combination of TDM and fiber optics means that an unlimited number of virtual control surfaces can be connected to the system.

The universal VADIS 880 mainframe accepts a variety of audio, data and DSP modules without limitation to inputs or outputs. All VADIS frames can act as a master digital audio sync, but can also slave to external house clock references, including the facility's NVision NS5500 Universal Sync Generator. The frame comes standard with a dual fail-safe power supply and dual-redundant digital audio sync modules.

Each of NPR West's five production suites features 4-fader VADIS DCII console surfaces, while the two on-air studios and the Technical Center were supplied short-loaded with 20-fader surfaces. Any source connected to any console surface can appear on any fader; entire console setups of sources, mix-minus, dynamics, EQ, bus assignments and so on can be recalled at the push of a button. Typical mixer layouts provide source selection per fader or several fader channels connected to the external router. TFT screens in each room display system settings and graphics for EQ/dynamics parameters. Each DCII can address four stereo output buses — PGM, AUD, UTL and Mix-Minus — plus various mix-minus DSP options, each with an individual talkback feature and stereo/mono configuration.

"Because of the VADIS system's distributed processing and closed LAN topology, there are no slaves and masters as such," says Greg Mensching, former Klotz digital sales engineer and system/technical designer for the NPR project. "Any console surface, in theory, can control any processing element anywhere in the building or, with access to the L.A.-to-D.C.-wide area network, anywhere in the NPR system. Integrating consoles, audio routers, logic-follow capabilities and distribution of digital audio sync can be a formidable proposition; VADIS networking is designed to dramatically streamline that process for NPR West."

NETWORKED DAWs

As with the New York and Washington facilities, NPR West features Dalet Digital Media Systems editing workstations, along with several high-capacity digital audio servers. The Dalet 5.1 Advanced Pro System comprises an array of 55 workstations connected via a 100-megabit Ethernet LAN to five servers that communicate with central hard drives via a high-speed Fibre Channel topology. (NPR has also installed 280 Dalet workstations throughout its main Washington, D.C., facilities.)

According to Ken Tankel of Dalet, "The system provides real-time sharing of all digitized media files that NPR [journalists and producers] generate for their programs. For high-demand systems requiring a terabyte of more of storage, we specify IBM Series FAST-T500 storage [arrays] configured in RAID-5 topology to ensure instant recovery from any hardware failure." Windows-based PCs are used for desktop editing and programming. A dual-loop Fibre Channel connection to each of the arrayed hard drives provides additional network redundancy. A total of 5 terabytes of digitized audio and metadata can be stored in the NPR West facility. "This is not the largest Dalet server array [being used by] a radio customer," notes Tankel. "XM Satellite Radio, for example, which provides 100 channels of [U.S. satellite delivery programming], features 28 terabytes of data — some 1.8 million songs — shared by a total of 350 workstations."

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Dalet's system uses a client/server architecture to provide real-time audio playback at any of the networked workstations, reading/writing audio files directly to NT/2000-based servers arrayed on a TCP/IP-driven LAN. Dalet's media asset-management system provides an integrated digital audio environment for recording, editing and storing audio, plus log creation and automated/live playback. All of NPR West's production studios, voice-over rooms, news preparation areas, producer areas and central control rooms are networked through the media asset-management system. Industry-standard TCP/IP and FTP protocols are used for most data transport within the network and to/from external sources.

Sybase SQL Professional ASE Microsoft SQL serves as the database for digital audio files and asset management; a single database references audio, text, multimedia files and other program-associated data. The Dalet system can edit and play out linear PCM, MPEG Layer-2 and MPEG Layer-3 data-compressed files, in stereo or mono, interchangeably.

"Our editing software handles eight stereo tracks simultaneously," Tankel explains, "and eliminates multiple transcodings. The Dalet editing software generates EDLs that are executed when a 'project' is saved. The EDL is executed on the MPEG files in dedicated DSP or using the workstation's CPU." Transcodings only occur if the finished format is different from any of the formats in the project.

Various software components handle specific functions within the Dalet server and workstation network. For example, manual recording; automated recording; 2, 4 and 8-track editing; and manual and automated play-out are all modules that can appear on the desktop. A flexible user rights-management system allows user access to specific tools and desktop environments tailored to specific needs and skills.

"NPR West is the one of the most significant developments in NPR's capacity to provide programming services to stations and listeners in the past two decades," says Kevin Klose, NPR president and CEO. "Years of thoughtful analysis, months of careful site selection and detailed facility planning have gone into NPR West. This means a huge expansion in our capacity to bring timely, comprehensive news of the West to our national newsmagazines, newscasts and cultural programming. The unique sounds and energies of this storied region and its people will be heard in lively new ways from NPR West."

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