

# CRISIS MANAGEMENT

## AV Empowers Emergency Response

### **ON A GOOD DAY, THE ROOM IS EMPTY.**

On a bad day, the 7500-square-foot Main Coordination Room (MCR) of the City of Los Angeles' Emergency Operations Center (EOC) is the epicenter of public safety, where coordination teams converge to support fire, EMT, police, hazmat, law, transportation, public works, and a host of other responders in a natural or manmade disaster.

In past decades, coordination of this life-saving work happened out of a hot, noisy, crowded bunker under City Hall that was itself vulnerable to earthquakes. On the heels of Sept. 11, California's \$600-million public safety bond measure, Proposition Q, yielded the \$107 million to pay for a new two-story EOC building in downtown that's designed to house three important tenants: the Emergency Management Department (EMD), the Los Angeles Police Department's Real Time Analysis and Critical Response Division (LAPD-RACR), and the Los Angeles Fire Department (LAFD).

This building and the mission of its tenants would come to be the solitary focus of technology consultant Spectrum ITC Group, a relatively small company that would spend four years embedded with the city and stakeholders, helping to design and execute a modern shared technology system. The project is an example of how AV is integral to workplace efficiency. It was also a difficult and singular opportunity for Spectrum to become a next-generation design

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**BY CYNTHIA WISEHART**





The Main Coordination Room for the Los Angeles Emergency Operations Center. Critical internal and external information sources are shared throughout the facility through an ambitious CATV system with a powerful headend. The Operation Golden Phoenix photo seen on the display wall is used with permission by NPS Center for Asymmetric Warfare.



Housed in a unique seismic-rated display structure by RP Visuals, four 10,000-lumen Digital Projection International Titan 1080p-700 3-chip projectors do the heavy lifting for the main display wall. Photo by Brad Howell

firm, capable of understanding how AV intersects with a building's overall systems design. To hear principal John Bilar tell just part of the story, the experience was—not unexpectedly—one of techno-politics; it put Spectrum in collaboration with—and at times at odds with—various departments and professionals from the city's IT entity to contractors of every discipline.

The goal of the new Emergency Operations Center was to facilitate professional collaboration; there are places to gather, plan, and execute—all supported by AV.

The building also needed a modern digital infrastructure to bring in vital data and information, and to share it among emergency teams that were not always collegial and that could be territorial—teams that would be operating under extreme stress and very low fault tolerance.

The heart of the EOC's critical news and information infrastructure is a cable TV (CATV) system with shared but independent distribution for the three main tenants (see sidebar on opposite page). This system brings in news and

**Equipment did not make it into our final design unless we had tested it here in our lab and beaten the crap out of it.**

*—John Bilar,  
technology consultant*

data from television, radio, and Internet sources as well as internal departmental data and other sources such as security camera feeds. Altogether, the system provides for 135 HD channels including over-the-air broadcast feeds, 45 fiber feeds, 10 satellite sources, 15 ATSC sources, 10 cable sources, 25 radio sources, and classified camera sources—all distributed to 45 venues throughout the building. The Main Coordination Room is the most dramatic of these venues.

It is dominated by a display wall that consists of four 10'x5'6" low-gain RP Visuals projection screens arranged in a 2x2 configuration on a customized seismic-rated display structure that is served by four 10,000-lumen Digital Projection International (DP) Titan projectors. Three NEC 70in. flatpanel displays flank each side for a total of six switchable displays. The routing and switching of the digital video signals is accomplished using an Extron 36x36 DVI matrix router. RGB Spectrum QuadView and MediaWall video processors provide for the image layouts to the display wall and provide a secondary bypass feed to the display wall.

# CATV HEADEND

“We started with discussions with the three stakeholders—the Emergency Management Department, the Los Angeles Police Department’s Real Time Analysis and Critical Response Division, and the Los Angeles Fire Department—and gained a rich understanding of their unique cultures and how the three departments operated and communicated internally, and with one another,” says Spectrum principal John Bilar.

Originally Bilar envisioned a single high-definition, hybrid analog/digital CATV system throughout the EOC facility. “However, it became clear that we needed a hybrid design with shared, yet independent news and information CATV distribution for three distinct and separate departments.”

The requirements included: Internal distribution of broadcast TV channels, multiple HD satellite news channels, selected local cable TV channels, and AM and FM radio sources; the ability for departments to personalize their individual CATV distribution with several channels of specific internal content and an internal scheduling channel; the capacity to generate high-definition department broadcast channels of a digital image source (selected via touchpanel), such as incident and resource status, EOC PC-based management applications, hazmat and fire area maps, Web media, and camera image sources from helicopters, vehicles, ATSAC, LARCOPS, city facility closed-circuit systems, and other classified imaging systems. In addition, each department needed to selectively share digital images/sources with other departments, with the ability to grant or revoke access on a per-source/per-destination basis, from their control panels. To accomplish this, Spectrum used an approach developed from one of its many Department of Defense design-build projects. From a touchscreen, users can select from a large number of classified high-resolution computer sources, set up a bank of preview displays, and then grant permission to a group or groups in various venues to view that specific array of sources. The user can also revoke the array of images previously sent to a specific destination on a case-by-case basis.

The users did not want set-top boxes, and adding viewer positions needed to be at minimal cost and effort. This was accomplished by modulating all sources into the single shared baseline CATV distribution system. The system uses a secondary headend in each of the equipment rooms to provide department

security and a location for department-specific local inserts to be incorporated into their CATV system. “The city project administrators were expecting a satellite HD set-top box at each viewing position at an estimated recurring facility cost of several thousand dollars each month. We negotiated directly with the satellite network, and by properly identifying the six key modulated system requirement conditions, we were able to reduce the recurring facility cost to less than \$120 per month.”

Here’s a source breakdown:

- 10 satellite. HD-component analog receiver outputs to AJA HD-SDI converters to Adtec digital encoders to deliver the ASI stream, and then to Blonder Tongue QAM modulators to insert the signals onto the EOC’s QAM CATV System. Bilar says that for future systems, he would test and evaluate the **Contemporary Research QMOD-SDI** to replace his \$25,000-per-HD-channel chain with one box at \$3,000 a channel.



**For incoming signals, survivability design dictated multiple antennas in parallel paths for broadcast and satellite sources with impedance-matched utility gain active multicouplers and stacked distribution methodology. Photo by Ron Baker**

- 15 Blonder Tongue ATSC-to-QAM transcoders
- 10 cable TV. The cable provider’s set-top box provided an NTSC signal that was modulated onto the EOC’s CATV system.
- 45 fiber feeds. Five venues within the three departments each provide nine digital fiber feeds to the CATV master headend. From here, eight of the fiber feeds can be distributed among the various departments. The ninth digital fiber feed from each of the facilities allows each department to selectively QAM-modulate any of their local high-definition digital video sources onto the EOC’s shared CATV system for the department broadcast channel. Nearly any PC, DVD player, camera, etc., can be routed to the CATV system for QAM-modulation and distribution throughout the entire EOC.

“We also leveraged the multiple inputs of the flatpanel displays and several DVI switching preselectors for the DP projectors to provide a redundant fallback path for critical news and information to the display wall should the primary DVI matrix router and associated video processors experience any failures,” Bilar says.

In the MCR, all sources are also available to flatpanel displays at each of the pod workspaces (see sidebar on opposite page), as well as to various adjoining conference rooms.

Room audio comes from 12 distributed Electro-Voice ceiling loudspeakers driven by several QSC multichannel amplifiers for sound reinforcement within the MCR.

The supporting infrastructure for the audiovisual display

is housed in four racks, including in part, Furman Sound power sequencers; Gefen DVI/audio Cat-5 receivers, DVI switchers, and an NTSC-to-HDMI scaler; and Extron DVI/Cat-5 and fiber-to-DVI receivers and transmitters, and DVI switchers and distribution amps. Control, both primary and backup, is via Crestron.

Eighteen Contemporary Research 232-ATSC QAM/ATSC/NTSC RF tuner/receivers (plus dozens more throughout the EOC) provide universal HDTV tuning and complete the cycle for the MCR component of the ambitious CATV system. This tuner/receiver was key to the system design (and emblematic of the design thinking) due to its controllability via AV control systems, its unique multiple simultaneous outputs (HDMI, HD analog, RGB/component, and composite), and its ability to reboot after a power outage in the same configuration.

It is worth mentioning that while the CATV system interacts with the LAN, the EOC backbone is decidedly RF. As due diligence, Bilar gave IT vendors the opportunity to make their case. However, with requirements such as 24/7/365 reception and distribution of 135 HD channels, the ability to recover from a power failure in less than two minutes without administration, the ability for users to incorporate department-specific content, the need to retain HD detail on the main display wall, the need to avoid set-top boxes and IP appliances, and scalability considerations for new viewer positions all proved insurmountable for a LAN-based system.

Here’s another reality that is not about technology, but government economics: The EOC job was so large that the city was Spectrum’s sole client for the duration of the project, and an arrangement put the company on the city payroll, anchored by Spectrum’s vice president of engineering, Bob Downs. Bilar says it was a win/win that resulted in considerable cost efficiencies, and it gave Spectrum the access to create and advocate truly integrated, nuanced systems.

In June, the city extended Spectrum’s contract to allow the last details of commissioning for the EMD and LAPD components, as well as commissioning of the LAFD component through June 2011. That contract became a budgetary casualty just four months later: As of the first of last month, the contract is suspended pending funding. The biggest disappointment? “We want to be able to finish the mission for the responders who are out there risking their lives,” Bilar says. After years of developing the systems vision, articulating the requirements, identifying the technology, and creating the detail designs to serve these stakeholders, he’d like to see it the rest of the way home. **EVC**



Spectrum began a one-year programmatic design for the EOC in 2003 and returned to design the systems in 2006, oversee the AV contractor, and do commissioning and testing over a continuous four-year period. Photo by Brad Howell



Users can configure workspaces supported by dedicated racks to prioritize and control the data and information sources via a Crestron control panel. Photo: Brad Howell

## COLLABORATIVE WORKSPACE

A key element to the Main Conference Room (MCR) design, the team pod worksurfaces are designed to be like modular, AV-enabled conference tables. Any team can occupy any table—the systems are all the same and can be configured to bring in content sources from the CATV system, PCs, and DVRs that suit that team’s information needs and workflow.

Each of the 16 team pods provide an essentially stand-alone AV system with two pullout equipment racks; a DVI video matrix router; a balanced, 2-channel audio matrix router; headphone amplifier; control processor with an associated 15in. control touchpanel and 40in. LCD flatpanel (with built-in speakers) on a retractable lift; and a standalone DVR/DVD player/recorder integrated with the department’s own, closed and independent CATV system.

All team pods are integrated with the MCR’s display wall and associated video and audio systems. Anything on the display wall or distributed to the overhead loudspeakers can

be readily pulled down to the pods’ AV system.

There are about 95 personnel positions throughout the MCR command floor. Each position has a distributed audio feed to its own audio headset. The audio source is selected via a small Crestron control keypad located at each position. The audio associated with any video source displayed on the multi-image display wall, along with AM/FM radio station presets, their local PC computer, etc. can be readily switched by using their personal keypad to scroll through available sources. “The most difficult thing to pull off was developing the specific user requirements for an all-important life/safety event-driven facility,” Bilal says, noting that the EMD staff must perform their duties in an extremely stressful environment that depends on communicating critical, time-sensitive information and data among one another and other city agencies and entities. “We were required to clearly understand their very structured protocols, methods, and processes of collaboration; how they would collect and disseminate important audiovisual information; how they would protect sensitive data. And it wasn’t the same for each department or team. We had to design shared systems that would allow each of them to distribute, view, and interact with critical news, data, and information the way they needed to, through an intuitive control systems interface that was also virtually fault-proof.”