how it works

Turning technology inside out

This power distribution panel provides **circuit breakers** for all major subsystems of the vehicle. At the bottom right of this section is an **antenna controller** for the smaller satellite dish on the roof of the UCV.

This area contains primary antenna controller/tracker and modems for the UCV. These components provide the truck's **primary satellite connectivity**.

This section contains the patch panel, spectrum analyzer and primary power amplifier control for the UCV's **satellite communications system**.

The Land Mobile Radio (LMR) section contains the different LMRs that are part of the truck's interoperable communications capability.

The **smaller triple screens** at the top of this area can display a wide array of the camera images or video sources. The **larger screens** connect to a keyboard/video matrix that allows users to tap into any computer resource in the vehicle.

Mobile Command

Chicago's Unified Command Vehicle delivers emergency operations center functions to disaster sites.

EOC on Wheels

July 2, 2007 By Andy Opsahl

The truck could serve as the city's primary EOC command center in a "doomsday" scenario in which both of Chicago's backup disaster management facilities were destroyed.

In 2006, the Chicago Office of Emergency Management and Communications (OEMC) unveiled its Unified Command Vehicle, a technology-packed truck designed to deliver the functions of the city's Emergency Operations Center (EOC) directly to disaster sites.

The truck is the OEMC's answer to a significant problem — a disaster obliterating a local emergency response team's remote communications facility or failover data center. These buildings serve as cities' backup plans in case their primary emergency operations centers (EOC) get knocked offline.

Chicago backed up its backup plan by putting an emergency command center with server failover capabilities on wheels.

"We have a nice emergency operations center," said James Argiropoulos, managing director of information technology at the OEMC. "We have a gorgeous 911 floor. It looks like NASA when you're looking down at it. But you have to be within the confines of the building.

"We've pooled the great aspects of this building, piped in a satellite and now we can afford to operate directly out of a vehicle," Argiropoulos said.

MOBILE NERVE CENTER

The truck could serve as the city's primary EOC command center in a "doomsday" scenario in which both of Chicago's backup disaster management facilities were destroyed, Argiropoulos said, though the city also plans to use the vehicle for small-scale emergencies that could benefit from an on-site command center.

"Maybe a storm hit the south side of Chicago," Argiropoulos said. "It's hit a small four-block-by-four-block area. A couple hundred people are without phones and electricity. The phone lines are damaged. The radio lines are damaged. We could roll that truck directly in and supplement that particular devastated area."

The satellite equipment mounted atop the vehicle gives it video and voice over Internet protocol (VoIP) capabilities, as well as secure Internet access.

"We're utilizing a satellite provider that provides us one of six satellites," Argiropoulos explained. "One is the primary, with the other five being redundant so that we don't have a point of failure at the satellite. We can take [all of the data] that was in the EOC building and pipe it directly, via satellite, to the vehicle."

The OEMC essentially owns and runs its own telephone company that connects all agencies critical to a first response to the OEMC.

"We have a little over 500 miles of fiber and 850 miles of copper that connects every police, fire and strategic government location back to us at the OEMC," Argiropoulos said.

The vehicle's satellite connects to the OEMC's self-healing fiber network, which carries VoIP signals back to agencies participating in the response. The truck also has its own cellular switch, which can utilize the satellite for cellular functionality. That becomes especially useful if Chicago's normal telecommunications infrastructure fails, Argiropoulos said.

"If we come into a devastated area, and the superintendent of police, the fire commissioner, the executive director, the chief emergency manager — the hard-core decision-makers — need cellular, and cellular has been substantially damaged," Argiropoulos said, "we can pass them one of our cell phones, pop up a 50-foot mast, and now we have instantaneous cellular."

Most responders won't actually work inside the vehicle, although it includes a five-person conference area for small-scale operations. The truck pulls a 16-foot trailer, carrying a tent that self-erects in four and a half minutes and accommodates up to 100 staff, who won't exactly be roughing it — the tent is outfitted with heating and cooling equipment, and power from the truck can supply 120 laptops and VoIP phones, along with 35 cellular phone connections.

BY ANDY OPSAHL | STAFF WRITER | ILLUSTRATION BY TOM McKEITH

"We can send our 911 calls, via satellite, directly out to the tent and have people processing calls directly from the tent," Argiropoulos said.

The setup also gives command center workers access to video data from the cameras positioned all over downtown Chicago. The cameras allow police and fire dispatchers to spot trouble that requires an emergency response, and they can route calls as needed.

MOVABLE HUB

The vehicle serves as a communications hub for federal, state and local agencies because the OEMC can tap into the city-owned fiber network and route emergency calls in ways that most efficiently serve those agencies' needs.
"Whether it's the Secret Service, the FBI, the CIA, the Chicago Police [Department] or suburban fire officials, the flexibility is there in terms of our phone routing because we own [the network]," Argiropoulos said. "We pipe it to the fiber network, which the public can't infiltrate."

The truck also connects to several radio bands.

"We have the VHF band and the UHF band. We have high band and low band," Argiropoulos said. "If you need to talk to the Department of Defense or the military, we've got high-frequency radio. If we need to talk to the Illinois Emergency Management Agency or FEMA [Federal Emergency Management Agency], we have low-band radios."

The truck can access 128 responder frequencies for the surrounding Chicagoland areas. The vehicle's users can tap into those frequencies to communicate with the regional responders using them.

"Within Cook County, you're talking about 100-plus police, fire and EMS [Emergency Management Services] agencies," Argiropoulos said. "We've already preprogrammed them."

Argiropoulos said the truck also lets agencies using different frequencies communicate with each other.

"If you need to bridge the frequencies, we have a VoIP bridge system, so we can tie the Chicago police with the Secret Service or the Secret Service with the FBI. We even have an encrypted port on our router."

Argiropoulos said agencies, like the Secret Service, the FBI and others needing extra confidentiality measures, find the encrypted functionality especially useful.

The UCV's two dispatch consoles, one intended for police and the other for fire. Located side-by-side, dispatchers can receive calls and issue assignments to police and fire units by radio, all of it through the vehicle's satellite link. Each console features a full version of the city's CAD system, an IP-based phone, three video monitors and a video switch controller that can assign any video signal to any of the three monitors, an intercom panel that provides full access to the digital matrix intercom system (from this panel the dispatcher can key any radio on the vehicle and can also cross-band multiple radios).

DUAL FUNCTIONALITY

Chicago maintains server redundancy buildings, but the city could choose to skip that expense because of the Unified Command Vehicle, said Chris Herndon, chief technologist for MorganFranklin Corp., the vehicle's vendor.

Herndon is pitching the vehicle to other local EOCs as a redundancy data center and remote command facility alternative to traditional remote buildings. The trucks can house dozens of rack mount servers, according to Herndon.

"Many of the newer CAD [computer-aided dispatch] systems are running on multiple 1-RU [rack unit] servers. We can dedicate well over 100 RU worth of rack space to house these servers. The servers that New Orleans uses are about 30 RU each, and their entire capability can be replicated in two of these servers, of which we have plenty of room to spare."

Though Chicago's vehicle could function in the place of its server-redundancy building, city government chose to maintain both the vehicle and the building as a measure of added security, explained Kevin Smith, OEMC spokesman.

"For Chicago, it's not the fact that it's a server replication as much as it is the redundancy of being able to host an emergency operations center remotely out in the field," Argiropoulos said.

Herndon is using the vehicle's dual functionality as a data center and communications facility as a selling point for its ability to cut government costs. He said governments could eliminate the money they spend on leasing remote data centers and office facilities that don't readily come with the hardware the mobile command vehicles contain.

Argiropoulos said he believes Chicago's Unified Command Vehicle is a model for the nation.

"This was something that was long overdue for the United States," he said. "It's a model. It's very methodical. It has tons of capabilities. It's not a tractor and trailer where you're going to put 20, 30 or 40 people in it. It's a network/server farm/cellular farm on wheels. We raise the satellite dish — we raise the mast — we bring the trailer with our own [figurative] building," he said. "That thing is chock-full of technology that can pretty much do anything."