



Maximising the response

Communication technology in ICUs (Incident Command Units) is undoubtedly gaining recognition as an integral part of all fire brigades response capabilities, writes Jose Sanchez de Muniain.

An example of this is Scotland, where this summer Fife Fire and Rescue received a new major incident ICU as part of an investment of over £5m in new state-of-the-art rescue equipment and facilities. This was a result of the Scottish Executive's new funding programme specifically for communication technologies. The resulting ICU, built by coachbuilder CEBOTEC, is based on a Mercedes 7.5 ton Atego chassis and includes a satellite dish and two main areas, a communications suite and a meeting room for operational briefings with a 42" plasma screen.

The basics – building an ICU

South Gloucestershire-based WH Bence has developed a reputation for building innovative, flexible mobile spaces for the Emergency Services. The company has become a specialist in the area of Command and Control Units and in the last 18-20 months has produced a range of these vehicles, each built to the requirements of a fire department and ranging in size from a Mercedes Sprinter up to an articulated trailer.

Sales Director Oliver Brown summarised for *F&R* readers some of the critical factors for designing and manufacturing command units. "Firstly, the command vehicles should be completely self-sufficient so firefighters can work as an island on scene. This entails the vehicles being built with sufficient on board power generation with generator sizes from 11KVA up to 27KVA, on

board air conditioning for both heating and cooling, and possibly the provision of facilities such as hot and cold drinks machines and refrigerators."

Oliver goes on to say that these vehicles must be built to allow multi purpose use, providing both on board communications via satellite broadband GSM phone network and the latest radio technology. "We have also tried to design and manufacture these emergency services vehicles to provide suitable workspace for personnel to gather for purposes of negotiation, making decisions more effectively or liaising with other support networks."

There is a growing trend among many fire departments for multi-vehicle command set ups, points out Brown, and he outlines that at least two recent contracts (with Royal Berkshire and South Yorkshire FRS) have opted for a rapid response Sprinter conversion type vehicle to assess situations before handing over to a larger Command Support Unit when it arrives on scene. "This allows for faster gathering of information prior to any decisions being made."



Strathclyde Fire & Rescue (Scotland) has just undergone a major ICU investment. Right: TW Mobile Engineering believes robustness and redundancy are critical design factors in ICU projects.

The environment that fire services operate on also has a limiting effect on the kind of ICU deployed, adds Oliver. "For example, London and Birmingham are both tight knit urban areas and this requires them to have a vehicle which is able to access any part of this area with little difficulty."

So where does a fire department start when it comes to outlining what they want? Oliver says that the most advantageous way of designing a new mobile Command Unit is firstly to discuss the equipment and IT support which is required on board the vehicle so that weight and power calculations can be completed. This enables the fire department to purchase a base chassis with the right weight capacity.

"One of the biggest problems we have faced with designing Command Units is the purchase of vehicles prior to a design/plan being put in place. Once the vehicle has been purchased you are then restricted to its limitations. Bence now offers an in-house weight planning guide and, in addition to this, provide support to the client for calculating power usage."

Finally, says Oliver, one of the biggest decisions is how to utilise the outside space of the vehicle. "The addition of externally mounted interactive screens have become quite a regular occurrence for the majority of the vehicles we have built, as well

with ICUs

as the addition of electric wind out awnings to provide cover for any briefings being held below."

Key trends in the US

TW Mobile Engineering is one of the Soncell North America companies serving public safety agencies across the US. Soncell NA is owned by Bowmar & Kirkland, one of the UK's largest privately held companies.

TW works with a range of partner vendors to provide capabilities such as:

- enabling the tracking of and communications with team members in both GPS and GPS denied environments (CHI Systems' small unit situational awareness systems)
- common operational picture software that includes video conferencing, collaborative whiteboarding etc (CommandAnywhere).

According to TW Mobile Engineering Managing Director Allen Johnston, there are several critical concerns and initiatives driving the development of incident command technologies in the US. These include the escalation of disasters, both natural and manmade, the emerging DSCA movement, (Defense Support of Civilian Authorities), and the need for better situational awareness across multiple agencies. "In the past most agencies operated with little interaction other than a single radio channel with the regional and federal agencies they interfaced with. As data and voice interoperability systems increase in capability and decrease in costs, more agencies are adding these types of capabilities to their command vehicles."

TW spends considerable time in the design stage with agencies making sure that their concerns and requirements are effectively addressed in their platforms. "We strive to ensure that units from our most compact tactical emergency communications kits to our largest command and control vehicles have the ability to perform the majority of communication and command functions

Dubai's new mobile media centre



This state of the art mobile media unit was recently manufactured at the technical workshop of Dubai Civil Defence, and it is considered the first of its kind in the whole region. The unit is a large van which was imported and converted into a mobile media center by introducing the necessary alterations to enable journalists to dispatch news live directly from accident fire scenes to media agencies.

The mobile media unit is equipped with communication devices comprising fax, telephone, lab top and printer, and three display screens connected to a 12-metre mobile stand camera mounted on top of the vehicle, and which can rotate 360 degrees horizontally and 180 degrees vertically. The camera is provided with a satellite dish to capture news live from satellite TV channels, particularly news related to the current major incident, and can be operated from a distance of 5km. The unit also includes A/C, fridge and first aid. The mobile Media center has been designed to accommodate 12 journalists and three spokespersons. Media reporters can use the mobile media unit to accompany firefighting teams to accident scenes where they can be directly acquainted with accident situation developments and get the information from one unified and reliable source.



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TW Mobile focusses on powering equipment regardless of the infrastructure, using hot swappable battery units, under-hood AC generators, and high power alternators.



regardless of the state of the physical infrastructure in which they are operating in. This takes the shape of making sure that all systems can be powered from a wide range of both AC and DC power sources, have multiple methods of connecting to the internet and to their partner agency networks, and most importantly, that they do this with simplicity of operation that enables all members of an agency to operate the systems," comments Johnston.

Some of the key technologies TW Mobile Engineering is involved with in the US include the establishment of rapidly deployed, tactical mesh networks, common operational picture software and systems, and voice and data interoperability, explains Johnston: "Robustness and redundancy are critical design factors in all of our projects. When critical events occur, oftentimes the conventional means of communication become overwhelmed. Cellular systems are taxed, agency websites are overrun with information requests and voice traffic on the radio is extensive. Being able to establish alternative means of staying in touch and sharing data is critical. Effective incident command vehicles must be able to stay in touch regardless of where they are and what type of data or information is required."

Several of the key trends that TW Mobile is experiencing at first hand involves incorporating very basic elements into all its platforms. "The first one is in simply replicating the tools and resources we have in our offices. Computing, printing, email, web access, telephone and access to the outside world via radio and television. The second is in the ability to share these elements with others in our working group. This is accomplished using secure wireless access points, WiFi handheld phones, satellite TV, and VOIP and Telular phone lines. Through the use of connectivity portals, umbilical cables and breakout boxes are able to share resources with others in the near field. One of the final areas we focus on is in powering all equipment regardless of infrastructure.



The Land Rover Discovery vehicles from Excelerate include a transportable satellite, private GSM, VoIP, wireless network, CCTV and video streaming.

We do this through the use of hot swappable battery units, under-hood AC generators providing up to 12KW of clean power, high output alternators and through minimizing current consumption through use of LED lighting."

Small is beautiful

Excelerate Technology, the UK leading supplier of satellite and wireless-based data, voice and video solutions to the emergency services launched last month a new generation of Rapid Response vehicles that have quickly invited much attention.

These Land Rover Discovery vehicles pack quite a technology punch, with transportable satellite, private GSM (a cellular network), VoIP (voice over Internet protocol), wireless network, CCTV, and video streaming. They also have four drop-down touch screens, COFDM (Coded Orthogonal Frequency Division Multiplexing) body worn camera kits, and a mobile BGAN (Broadband Global Area Network) solution that delivers high speed broadband access on the move.

David Savage, CEO of Excelerate, has been pleasantly surprised by the market reaction to this latest generation of smaller incident command vehicles, and has received enquiries from all over the globe, including from the US military. "These vehicles contain the same technology that exists in larger incident command units, and the reaction has been surprising. People have been saying that they didn't realise they could get it on a smaller vehicle. Interestingly, however, we've had this capability for over two years now."

Flexibility is a chief attraction to emergency services. The new vehicles offer the forward command tools to assess and monitor serious incidents, but they can also double up as tactical CBRN units to analyse information and pass it higher up the command chain.

As a company operating and managing its own satellite and private GSM network, Excelerate is accustomed to dealing with the perception that using satellite for broadband usage is expensive. "This perception could not be more wrong. The monthly running costs of having 1.5 megabyte satellite connection can be a fraction of the running costs of a number of mobile phones alone. And because we have our own satellite link we can carve it up to suit our customers needs." Savage goes on to explain that some customers share the bandwidth with neighbouring departments, because generally incidents don't take place at the same time. "However as we control our un-contended satellite bandwidth we can create levels of capability, service and cost to suit any service level requirement and budget. Even with applications like video we are very conscious that there is a limit beyond which it would be cost prohibitive for fire services."

Fire brigades themselves are highly conscious too of the financial and geographical limitations of different types of communication technologies.

Royal Berkshire Fire & Rescue Service in the UK invested last year in two mobile incident command vehicles with a VectorCommand Command Support System, all part of a plan to create a 21st century platform for incident command.

Within Royal Berkshire's ICUs, different types of communication equipment are being used depending on the circumstances, keeping costs to a minimum without compromising on operational effectiveness:

- On station the communications from the units (data) uses a wireless bridge to existing LAN /WAN;
- When mobile to an incident or just mobile they will use 3G/GPRS;
- When parked at an incident they will use 3G/GPRS or satellite;
- If satellite and 3G/GPRS are not available (due to location) they will use wireless links to the second vehicle that can

An eye in the sky – by MW Power

Urban departments are increasingly taking up unmanned aerial vehicles (UAVs) to deliver quality aerial photography, live streaming, and thermal images from the fire ground straight into ICUs and beyond.



These are not regarded by their users as toys for the boys, but an investment that has a clear benefit of providing aerial views (including thermal imaging) that would not have been available otherwise.

Additionally, brigades are using UAVs to reveal potential fire hazards, as well as allowing a commanding officer to assess a situation on arrival, without having to attend a scene for assessment purposes.

Alistair Fox, Sales Director at MW Power, supplies microdrones to the military and emergency services. "The emergency services have long-desired a low cost 'view from the air'. Our drone is the result of an eight-year R&D process, initially based upon on military operations but more recently focussed on the feedback from our growing number of emergency services users."

The result is that West Midlands Fire Service is the first fire service in the UK to take one of MW Power's UAVs after a long trial period. Hampshire Fire and Rescue also currently use a remote controlled helicopter supplied by Carvec, with GPS and thermal imaging capabilities.

West Midlands will this month be taking up an upgraded drone (the MD4-1000) which provides an hour's flight time and a speed of 50mph, and which can fly with maximum wind speeds of 28mph whilst providing live video footage to the ICU.

"We've had interest from law enforcement agencies as well as the Health and Safety Laboratory (a UK centre of excellence for health and safety research and incident investigations). The latter are working on air sampling, so that the drone can analyse chemicals and gases in the air. This will help minimise the risks to responders, who will not have to don a hazmat suit to get samples for analysis. We are currently working on phase two of this project, which is configuring the data stream of the chemical analysis as the drone is flying through an area. This is a forthcoming attraction."

Available now is the thermal imaging capability, which Fox points out gives provides absolute temperatures from the drone.

Fox admits that microdrones are not suited to all fire departments, mainly because of their limitations if winds are too strong, but he adds that MW Power have recently launched a fixed-wing product to their range, LV960, which provides 3-4 km video range, ideally suited to the more rural operations, including forest fire investigation and search and rescue.

There are also issues regarding Civil Aviation Authority regulations and necessary permissions to fly. "Despite being a small, unmanned craft, the use of a remote-controlled helicopter constitutes an aircraft that requires all the necessary permissions as other manned devices, albeit within different parameters," concludes Fox

art command vehicles which come complete with incident ground and rear-haul data communications bearers as well as the traditional voice communications systems. Inevitably such vehicles incorporate a number of computers and associated hardware, but rarely is the investment in the management information systems proportionate to the spend on hardware and communications."

In other words, it's all very well fire departments investing in hardware, but not if the same focus is not given to the applications that will run over it. "This presents a number of challenges, primarily that a large hardware investment does not generate the commensurate transformation of capability. Only when an appropriate software system is installed – such as the Command Support System, which integrates multiple information sources to deliver a common operational picture, dynamically updated – can the right level of return on investment be delivered."

Stafford points out that increasingly the emphasis is on enabling all responders to deliver enhanced incident management capability and a common operational picture within and between agencies. As a result: "Project teams are increasingly looking for suppliers willing to focus on interoperable management information systems and the underlying hardware and communications bearers, but deployable with existing vehicles, or indeed into some more flexible command environment. In South Yorkshire, the Fire and Rescue Service ICU is being integrated, using Command Support System installations, with both police and local resilience forum command rooms, to build interoperability."

Excelerate was the lead contractor with the Royal Berkshire FRS incident command vehicle project, and what the original brief by the deputy Fire Chief Olaf Baars aimed for could provide food for thought to other brigades, believes Savage. "This was a big challenge for us, because Berkshire didn't just want two incident command vehicles for operations, they also wanted a solution for their civil contingency capability with regards business continuity. So if for whatever reason they lost their own command and control centre, they could run operations from there ICUs. And the answer is yes they can. And things like that do happen – it could be as simple as a person with a JCB digger inadvertently cutting through a copper wire. It happens, and as a result most of our customers who upgrade their vehicles also buy a satellite dish for their headquarters.

"The second RBFRS Vehicle fulfils a dual purpose role, firstly as a community fire education & awareness unit and secondly as a Rapid Response Incident Command Unit for some of the smaller incidents."



Top: The MD4-200 microdrone by MW Power provides a low-cost "view from the air".

Right: ICU as used by Royal Berkshire FRS, at Windsor Castle.

access satellite/3G/GPRS;

- If possible, for technical or physical reasons, (with permission) a wireless bridge to existing broadband (this may be domestic or commercial).

Major incidents — it's what you do with the technology that counts

Having the most sophisticated technology possible does not change the fact that what matters is how you use it.

Rod Stafford, director of command development for command technology company VectorCommand, outlines that over the last two years many emergency responder organisations have been reviewing their arrangements for supporting large-scale response to major incidents. "In most cases this has involved initiating projects to procure state-of-the-