HOW CONNECTIVITY ENABLES SMARTER, FASTER EMERGENCY RESPONSE

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In late May, Critical Comms and GovTech Review magazines partnered with technology company Cradlepoint to run seminars in Melbourne and Sydney on the theme of 'Connectivity for Smarter, Faster Emergency Response', offering insights into how emergency services agencies are enhancing safety and transforming operations though technology and secure connectivity. So what were the talking points from these two events? Read on to find out.

Surf life saving stories

Of course emergency services have not always had connectivity at their disposal, but that doesn't mean they should stay that way. That was certainly the argument being made by Surf Life Saving NSW (SLSNSW) CEO Steven Pearce, who detailed how his organisation began in 1907 as a group of guys conducting rescues on Bondi Beach and has since grown to be the largest volunteer emergency service in Australia, with 79,000 volunteers, a State Operations Centre and even its own standalone digital radio network.

Pearce said that SLSNSW has always been willing to support other agencies when needed – such as during the 1955 Maitland Flood, when they conducted rescues using their surf boats. But this support was especially apparent during the Black Summer bushfires, when the South Coast found itself cut off from outside help and was entirely dependent on local emergency responders – with lifesavers assisting with rescues and evacuations. This isolation continued when bushfires took out the government radio network, threatening public safety communications – but because SLSNSW had its own network, the local police and ambulance services were able to use repeaters to jump onto that.

SLSNSW's capabilities were further showcased during the NSW floods in 2021 and 2022, when they went out in their boats to support an overwhelmed SES. Here, SLSNSW's greatest asset was in fact its status as the largest provider and operator of drones in Australasia, with 300 unmanned aerial vehicles (UAVs) and 450+ pilots at its disposal. These drones were used for surveillance in flooded areas, livestreaming footage back to control centres so the SES could deploy their resources to the locations that needed them the most – a capability they had never had before.

Mapping out solutions

Sometimes, connectivity is about taking a basic form of equipment and enhancing it. For Lisa Dykes, Products Group Director at geospatial company NGIS, one of the most valuable pieces of kit anyone can have is a map.

Dykes described the humble map as one of the most important tools available to us in an emergency, as it offers a universal language that can be understood by everyone. During the same incident, fire-

fighters could use a map to decide how to best cut off a fire front, while residents can use the same map to navigate to safety and community associations could use it to understand the accessibility of local evacuation centres. And maps now have so many more capabilities than they used to, thanks to enhancements provided by geographic information systems (GIS) – mapping software that stores, manages, analyses, edits, outputs and visualises geographic data.

How can geospatial technology such as GIS be used for emergency response? To give an example, Dykes noted that emergency services vehicles need to know the fastest route to an incident, and specialised software is now able to detect road and traffic conditions within seconds and provide updates to dispatchers in real time, reducing reliance on radio comms. Point of interest (POI) data can meanwhile provide emergency services with more than one data point to identify a location, while geocoding systems like what3words offer exact coordinates, down to one metre, anywhere in the world. These systems are particularly useful in large and remote areas such as farm stations and nature reserves, where a simple street address is not sufficient.

Vehicle connectivity

So what other technology is being used by emergency services vehicles? Nathan McGregor and John Hopping, representing Cradlepoint, noted that a lot of responder vehicles are these days kitted out like a mobile office, with features like laptops, dashcams, onboard Wi-Fi, GPS, telemetry and PTT radios. And that's all very well in urban areas, but as these vehicles move away from the CBD, and 4G and 5G networks become patchy, they need a reliable way to stay connected.

For always-on connectivity on the go, McGregor and Hopping recommend using a software-defined wide area network (SD-WAN). Users simply purchase a service such as a 5G SIM and/or LEO satellite connection, plug them into a router, and the router will decide which service to use based on which is working best at any one point in time. For

extra resilience, Cradlepoint offers three 'intelligent bonding' techniques:

- Flow balancing – where data is spread across two or more WAN links, providing a load-sharing ability. If one link fails or degrades, it goes over to the other.
- Flow duplication – where traffic is sent down two WAN links simultaneously, with the slower packet discarded once the first reaches its destination. If there's an interruption with one service, it will switch to the other.
- Bandwidth aggregation – combining two or more lower-speed WAN links into one higher-speed link to achieve greater bandwidth.

Apart from SD-WAN, vehicles in regional areas can be well served by vehicle-as-a-node (VaaN) technology, which creates a Wi-Fi 'bubble' around a vehicle enabling connection to the internet; mesh networks, which share WAN resources across multiple vehicles to enable communication over a large location (a fire ground, for instance); and Rapid Response Connectivity units – small trailers that can be wheeled into a large location to provide a private 5G network, with a cellular signal that can support up to 1000 users.

The future

All these technologies are being used to support our emergency services now, but what does the future hold? Answering this question is the job of Natural Hazards Research Australia (NHRA), a not-for-profit organisation with a vision of building safer, more resilient communities through research and innovation.

NHRA's CEO, Andrew Gissing, noted that the impact of climate change means we're living in an environment of increasing natural hazard risk, and that we need to move from being behind the curve to getting ahead of it. This will require transformational thinking, looking one or two decades ahead to ask the big questions about what our society will look like in the future and what we can do now to prepare for that. Connectivity will play a key role here, as technology such as early-warning systems and evacuation alerts sent directly to people's phones has already helped tremendously in reducing loss of life during disasters.

With this in mind, NHRA ran a project over the last 12 months with 300 different stakeholders from across the country to drive big and bold ideas. This culminated in the Be Ahead of Ready report, which imagines possibilities such as:

- Real-time forecasting to help emergency services predict the people and properties most at risk when hazards threaten;
- Autonomous assets, such as drones, being used for ongoing maintenance of critical infrastructure as well as search and rescue operations in dangerous areas;
- Augmented reality that could show you predicted flood levels and other risks to your property in the event of natural hazards; and
- Dynamic measurement to provide a continuous snapshot of natural hazard risk and resilience across the country, rather than relying on outdated, paper-based census data.

According to Gissing, public–private partnerships will be crucial to driving this sort of innovation, as will cross-sectoral collaboration; after all, emergency responders don't create technology, they just use it. Conversations between tech companies and users will thus be key to addressing what responders actually want, and need, out of their technology.

Conclusion

As climate change takes hold on our sunburnt country, escalating the risk of natural disasters and other hazards, it is crucial to ensure always-on connectivity for our emergency responders – particularly those servicing regional and remote areas. In order to achieve this, public and private entities must work together to envision new technologies, as well as new use cases for existing technologies. Only then will we best be able to protect both our emergency services and the citizens they serve.

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