



WHITEPAPER

# TACTICAL RESPONSE UNITS

## THE CHALLENGE

Tactical Response teams love it when everything goes smoothly, particularly as it applies to their communications.

In an ideal world, their LMR/DMR radios (Motorola, Harris etc. etc.) will work and stay connected or their mobile phones will continue to function with their operations related apps and maybe PTToc (PTT over Cellular) and the mission will conclude successfully.

Such is the case most of the time. However, what happens when communications don't work? What happens when a major incident occurs and the cellular network is heavily congested or nearby cell towers are taken out of action?

Or when the team has to deploy underground, in tunnels, underground hotel car parks, in subterranean infrastructure, where there is no cellular network available? What happens if a First Responder team has to answer a call in mountainous terrain where there is no DMR/LMR coverage?

Or in remote coastal areas where there is neither cellular or radio infrastructure? Search & Rescue, Ambulance and Police have been faced with these issues in abundance in Australia, and in remote parts of the USA, for many years and have really struggled to overcome these challenges until recently.



SovSys PTTMesh  
World's smallest truly hand-held IP Mesh radio

## THE SOLUTION: POP-UP OR AD HOC NETWORKS

Cellular networks and radio networks have one thing in common. They both require a network of fixed radio/cell towers to provide communications access. When the mobile device or radio goes out of range of the fixed infrastructure, then the user is out of communication, and potentially vulnerable.

So, why not bring your network with you? In a critical response a team of say 6, 10, 20, 50 or more responders need to stay in touch with each other, as a bare minimum. Information needs to be shared, voice comms needs to be available, a command structure needs to be in place that can be accessed by all team members. Tactical IP Mesh networks work without any infrastructure.

As the bodyworn/hand-held or vehicle-based IP Mesh radios deploy, they organically form a fluid network, with each IP Mesh radio, on each officer, acting automatically as a relay in the network. No cell towers, no masts, no fixed infrastructure just more and more radios adding to the fluid network, extending the communications access across the incident ground. Every user stays in touch. Even if a user goes out of range, he is back in the network within 2 or 3 seconds once he moves back within range of any other IP Mesh radio in the network.

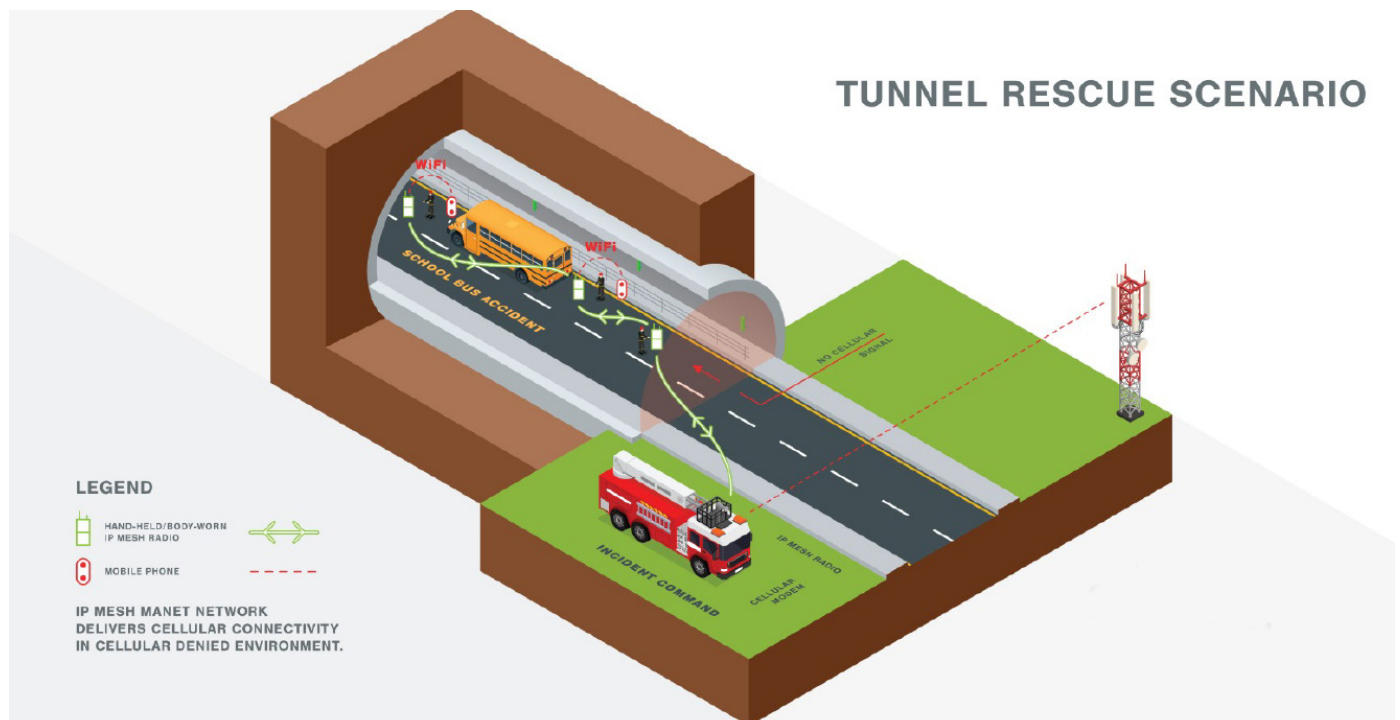
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No hand shaking or authentication required, as he was already a known radio in the network. Each IP Mesh radio is a source of IP data (such as images, maps, schematics), voice and video. They can be used for just one source, or all three simultaneously.

So, now we have a secure, encrypted, mobile network that ensures every team member stays in comms with the rest of the team, reducing personal risk. And the whole team can exchange operational data, voice and video across the encrypted, mobile network. For example, a First Responder at a tunnel incident, deep in a tunnel, say 4 miles long, with no cellular network, can capture video of an injured person, or take a photo of a suspicious package, and transmit this to Command (C2) for advice and instruction. C2 can then respond instantly, while the data is current, and deliver orders.

Likewise, a surveillance team may be following a target, needing eyes on the target at all times, and the target takes an elevator to the hotel B3 car park, deep underground, where there is no cellular network and DMR radios will not work. No matter how many floors underground the target goes, the IP Mesh network will continue to operate.

If the officer following the target observes that he is losing comms with his team mates, then another officer with an IP Mesh radio moves closer to the lead officer, acting as a relay and strengthens the link such that live video is available at all times to C2, parked in a Command vehicle, on the surface, outside the hotel lobby. This operation can all be performed covertly, with small, low power, hand-held IP Mesh radios concealed about the person of the surveillance team members.



## REAL NETWORK ACCESS

But what if some of the data needs to be verified back at HQ? What if the Paramedic needs to consult a Doctor at a hospital? How does the IP Mesh radio operator access the real network when he is deep in a tunnel or in a hotel basement car park?

Simple, as long as any one of the IP Mesh radios in the network can access the real network, then that access is available to all users in the IP Mesh network.

Typically, an IP Mesh radio at a C2 post, whether in a vehicle or at a fixed location, will have been connected to a cellular modem, such as a Cradlepoint Modem, which can provide cellular network access.

A satellite terminal attached to an IP Mesh radio will deliver the same network access to all the IP Mesh radios, via the IP Mesh radio connected to the BGAN/VGAN, SATCOM OTM (On The Move).

We mentioned above that operators can continue to use their mobile devices while in the IP Mesh network but how does the cellular device, access the IP Mesh network?

Every one of our PTT Mesh IP Mesh radios has an integral Wi Fi access point (hot spot) as well as a Bluetooth access point and a GPS receiver so we know where all our users are at any time when they can see a GPS satellite, outside with clear sight of the sky.

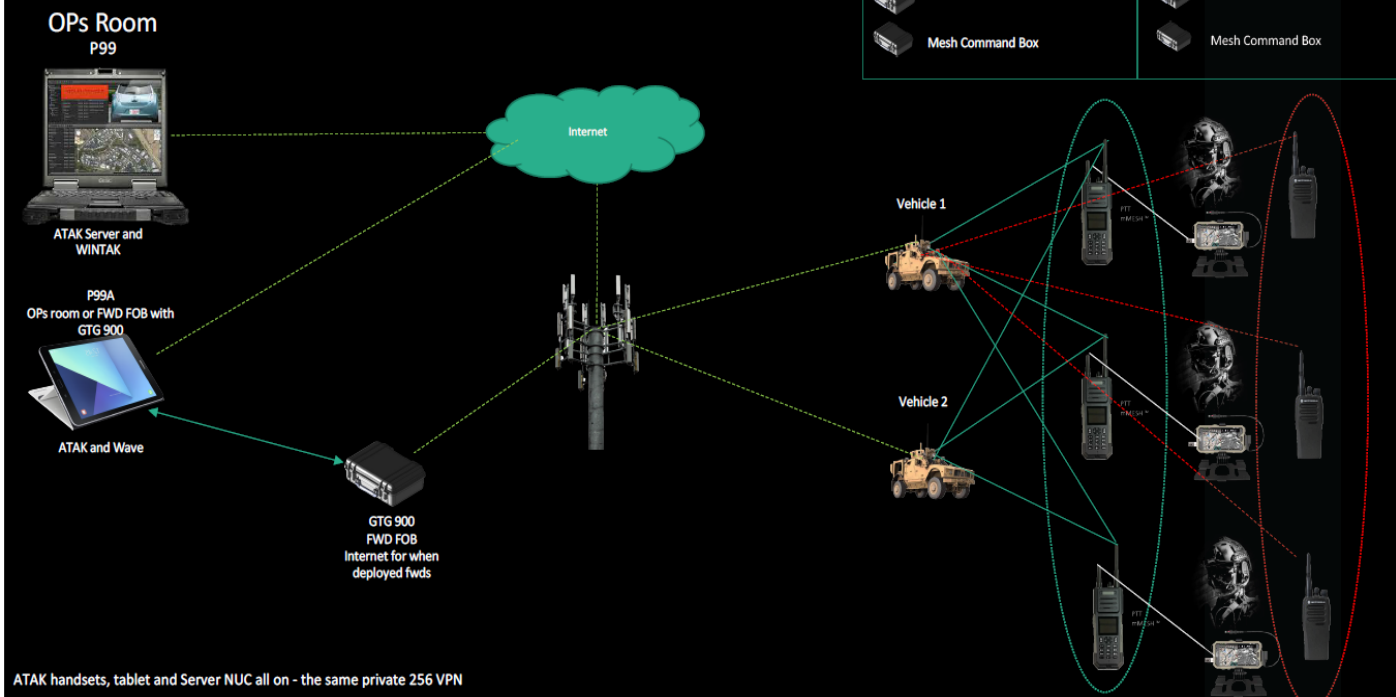
All the operator needs to do is to log on via their Wi Fi (or Bluetooth) to the SSID being broadcast by the IP Mesh radio and they can continue to operate any apps or functions on their mobile devices that do not require server access.

For example, in a cellular denied environment users can continue to use Face Time for video calls, whereas WhatsApp, for example, will not work as it requires server access to enable the comms link.

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OFFICIAL SENSITIVE

### SOVSYS MESH GENERAL



“You mentioned that each of your PTT Mesh IP Mesh radios has a GPS receiver for outdoor tracking. But what happens when my team members are in that tunnel you mentioned, or deep in the hotel car park, with maybe 6 officers deployed on the operation, all at different floors in the car park? How can I track their whereabouts to keep them safe, without GPS?”

## INDOOR TRACKING WITH NO GPS

Indoor tracking, in 3D, namely across the X,Y and Z axes, has been the holy grail for tactical response teams for 25 years. Various solutions have been proposed, from building maps linked to fixed sensors around or in the building, to beacons that can be deployed at strategic points around the incident ground, but they all lack one fundamental element, a network to carry the sensor results to the Command software that can process the location data in real time.

I wonder how we could deploy such a network, without the need for beacons surrounding the site, or in-building sensors or building maps and all that cumbersome set-up that is necessary to deploy these solutions?

Yes, you guessed it use our PTT Mesh IP Mesh Ad-Hoc network to provide the comms layer for the indoor tracking system to deliver the location results. And, by the way, what if there was an indoor tracking solution that only needed a small, lightweight body worn sensor connected over Wi Fi to our PTT Mesh radios?

Well, this exact solution is now available, delivering real time, indoor tracking, across the X,Y,Z axes allowing a live breadcrumb trail or a “dot on the map” for each operator, giving Command the comfort and security of knowing where the team members are at all times.



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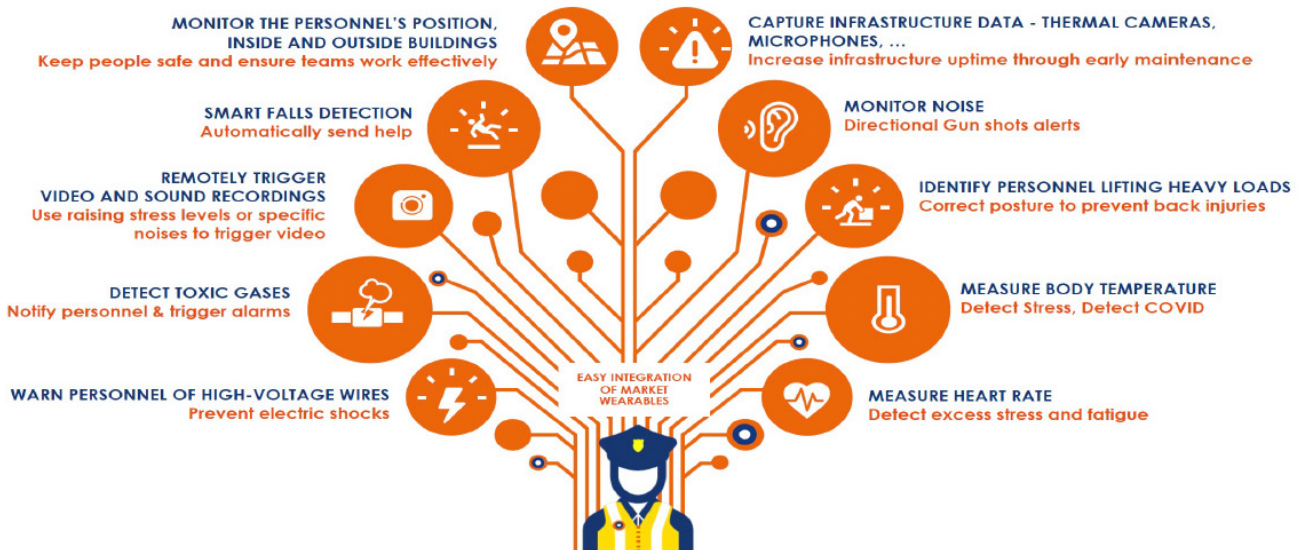
# BODYWORN SENSOR SOLUTIONS

Now, let's add a sensor system that can alert Command to environmental hazards (such as the presence of toxic gases or other substances), biometric stresses (changes in stress levels, heart rate, body temperature etc.) and facilitate comms with the operator to warn him/her of these dangers. Let's also add a "man down" sensor with an inbuilt response mechanism to acknowledge the operator has fallen, but may not be injured.

If the "man down" alert is not responded to within a pre-set time period (maybe 30 seconds?) then we know that our man/woman is in danger and we can deploy a rescue team which knows exactly where the officer is due to the indoor tracking system. This sensor system relies on "always on" cellular connectivity to process the data and return the data and/or alerts to the wearer, but what if the wearer is in a tunnel, underground you can tell where this is going, can't you?

Naturally, the PTT Mesh radios provide the cellular connectivity for the sensor systems to operate in the absence of a cellular network. We recently tested this capability in the harshest of RF environment in the Catacombs underneath the streets of Paris, with Police Nationale and the BRI (Counter Terrorism Commando).

## A centralized hub powers the plug-and-play sensor ecosystem and sends data to the cloud



**Wearable sensors save lives, protect health and improve efficiency**

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