



Sovereign
Systems

mMESH & CELLULAR MODEM

INTRODUCTION





“The speed of setting up the mesh is a huge benefit to this great solution.”

MESH INTRODUCTION

Welcome to our introduction:

- IP mesh networks, our popular 500mW PTT radio, our other mesh products, and overview of the use and benefits of mesh
- Cellular/Satcom addition

Website: www.sovsys.co

Email: connect@sovsys.co

No part of this document may be reproduced in any form or by any means, or used to make any derivatives such as translation, transformation, or adaptation without permission.

Copyright © Sovereign Systems Ltd. Pte.

WHO **WE** ARE

Sovereign Systems are leaders and trusted partners in the military, homeland and emergency services, tactical and secure communications system communication solutions providers.

- HQ IN SINGAPORE, SISTER COMPANIES IN WELLINGTON, NZ AND DUBLIN, IRELAND, WITH ALLIANCE MEMBER COMPANIES IN UK AND UAE
- PRIVATELY OWNED
- TACTICAL COMMUNICATIONS & SURVEILLANCE IS THE CORE BUSINESS
- IMSI CATCHERS AND OTHER FORMS OF CELLULAR SURVEILLANCE
- OSINT AND FINANCIAL INVESTIGATION SOLUTIONS SUCCESSFULLY DEPLOYED



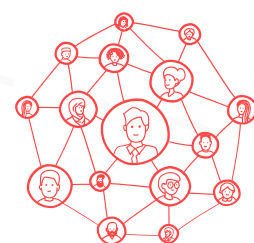
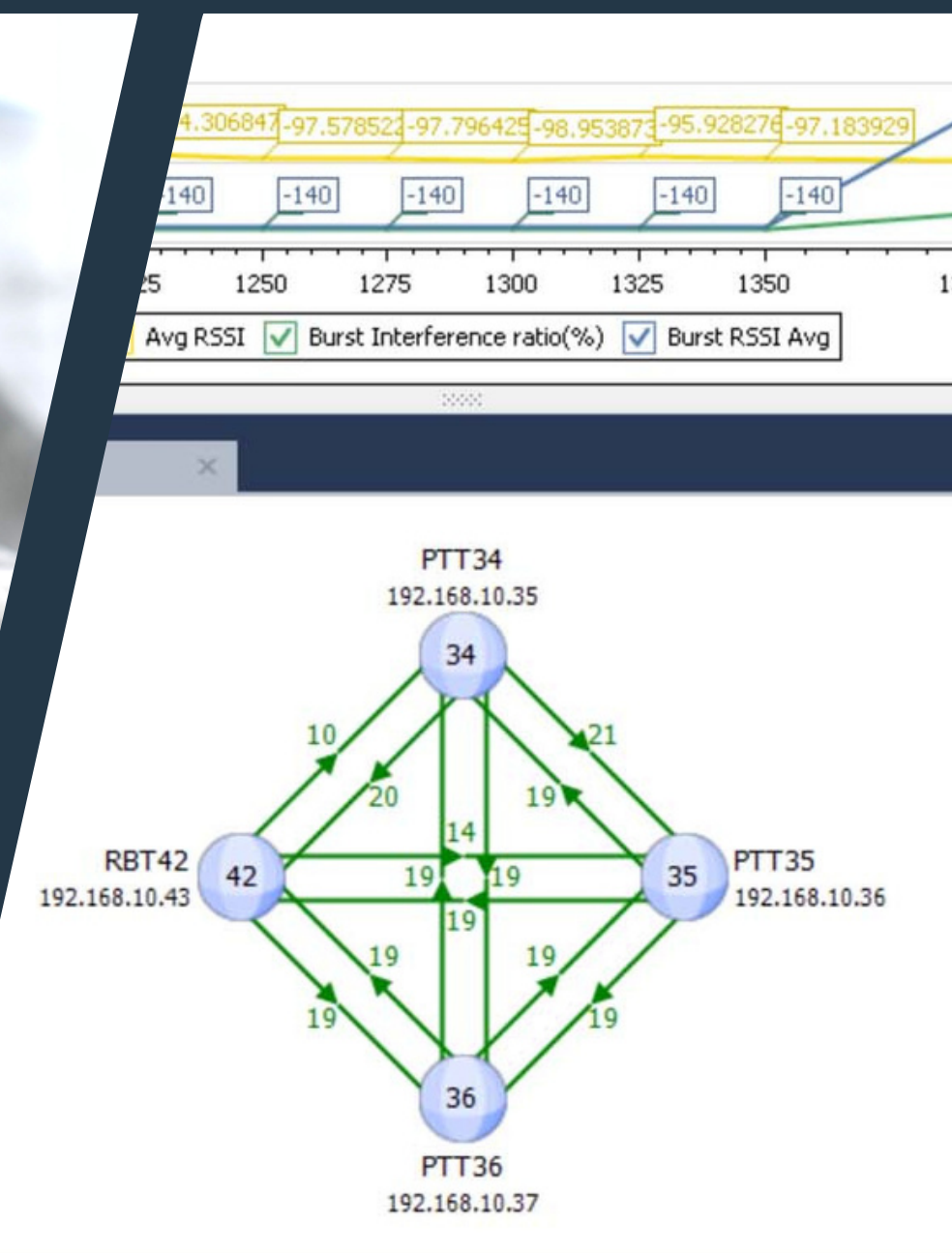
” We especially love the integrated GPS, and Wi Fi access point, so we can easily run ATAK natively in the local Mesh network.

WHAT IS AN IP MESH NETWORK?

A **mesh radio** is part of a type of wireless **network** that uses a mesh topology to enable communication between devices. In a mesh radio network, each device acts as a node that can communicate with other radios/nodes directly or indirectly, through other nodes in the network.

Unlike traditional point-to-point wireless networks, mesh radio networks can provide greater coverage and reliability by allowing data to be routed through multiple nodes. This makes mesh radios ideal for applications such as large-scale wireless sensor networks, smart grids, and disaster response networks, where reliable communication is critical.

Our mMESH™ products fully support mobility, allowing teams to communicate anywhere, anytime, without the need for public/cellular infrastructure. They have been successfully deployed for the management of unmanned drones, convoy movements, anti-terror tactical units, fire-fighting units, and numerous other scenarios where a secure, quick-deploying, private network is critical.



Our mMESH™ products use COFDM radio frequency technology to form reliable networks in a matter of minutes, even in non line-of-sight situations.



WHAT ARE THE BENEFITS OF MESH?

Mesh networking offers several benefits over traditional topologies, including:

Scalability: Mesh networks are highly scalable, as new nodes can be easily added to the network without the need for additional infrastructure. This makes them ideal for large-scale deployments, such as smart cities or industrial IoT applications.

Reliability: Mesh networks are self-healing, meaning that if one node fails or becomes disconnected, the network can automatically reroute traffic through other nodes. This makes mesh networks more reliable than traditional networks, which can be vulnerable to single points of failure.

Flexibility: Mesh networks can be deployed in a variety of environments, including urban, rural, and industrial settings. They can also be used for a wide range of applications, such as wireless sensor networks, home automation, and industrial IoT.

Lower cost: Mesh networks can be less expensive to deploy than traditional networks, as they require less infrastructure and can be more easily expanded. This can make them an attractive option for businesses and organizations that need to deploy wireless networks on a budget.

Increased coverage: Mesh networks can cover larger areas than traditional networks, as nodes can be placed further apart and data can be routed through multiple nodes. This makes mesh networks ideal for applications such as smart cities or large industrial complexes.

“*The ease of use, of both the PTT radio, and the UI is remarkable. It takes no time from out of the box, to up and running.*”

WHAT ARE THE FEATURES OF OUR MESH?

There are numerous benefits of mesh, to name a few:

Self-forming, self-healing, no central master, **no single point of failure**

Adaptive Routing – automatically selects the best route for transmission

Transparent IP Networking – connects to multiple IP devices, no complex network programming

Multi-directional – transmission could be conducted both ways between transmitter and receiver and vice versa, enables control and data transmission at the same time

Multi-channel Networks - network could utilize multiple RF channels or frequency bands within a network while still providing the plug and play functionality of a single Layer 2 switch

All of these networking capabilities combine to provide **robust high-speed connectivity** similar to what is offered by state of the art 3G/4G networking, but in mission critical operational scenarios where permanent wireless infrastructure is not available

Transmission is arbitrated by passing a token between mesh radios, using COFDM technology

Each mMESH™ radio can provide a **local WiFi network**, with mobile phones, and other devices accessing the private network via the radio



“ *Being able to use each radio as a WiFi access point to connect smartphones and other devices is very beneficial.* ”



THE REQUIREMENTS OF NEEDING MESH?

The requirement for a mesh solution include:

1. Extending connectivity to personnel in challenging environments.....the “Last Mile”
2. Real time **situational awareness**
3. **Unreachable areas** by man and/or vehicle
4. Communication **infrastructure damaged**
5. **Lack of real time** on-the-ground information
6. Pop-Up network...**Bring Your Own Network!!**
7. Real-time connectivity **without any infrastructure**
8. **UAV** add-on

“ *Not needing any infrastructure to deploy is an amazing benefit* ”

MESH USERS

The use of mesh covers many sectors and industries.

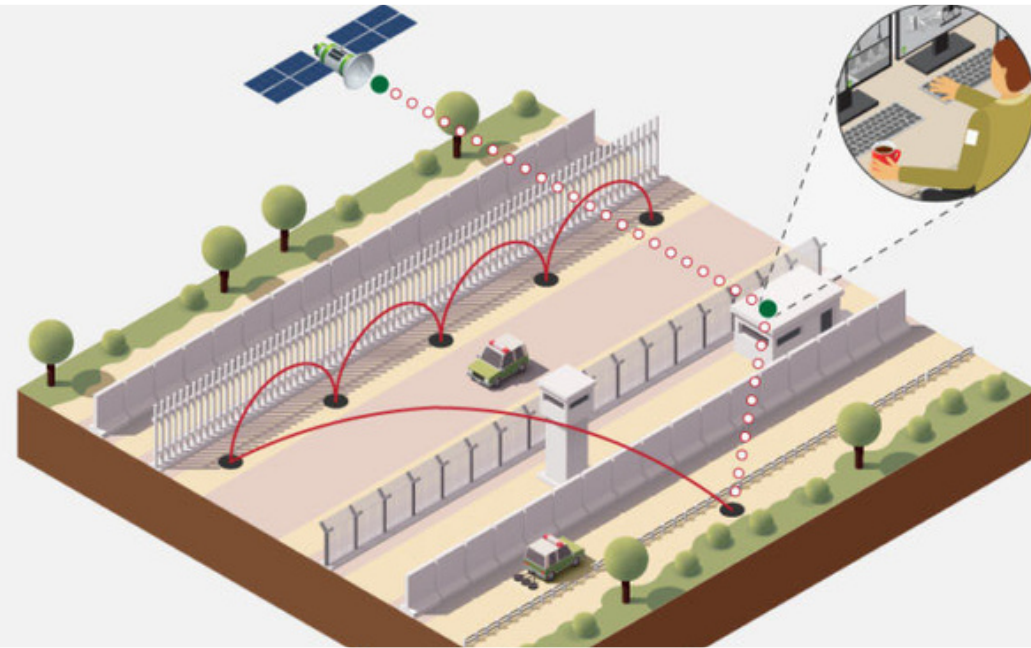
Team-based government forces such as those in police, fire departments, border security, search & rescue, and personal protection security, for unmanned platforms and robotics, for vehicles, for ad-hoc rapid deploy, for infrastructure.



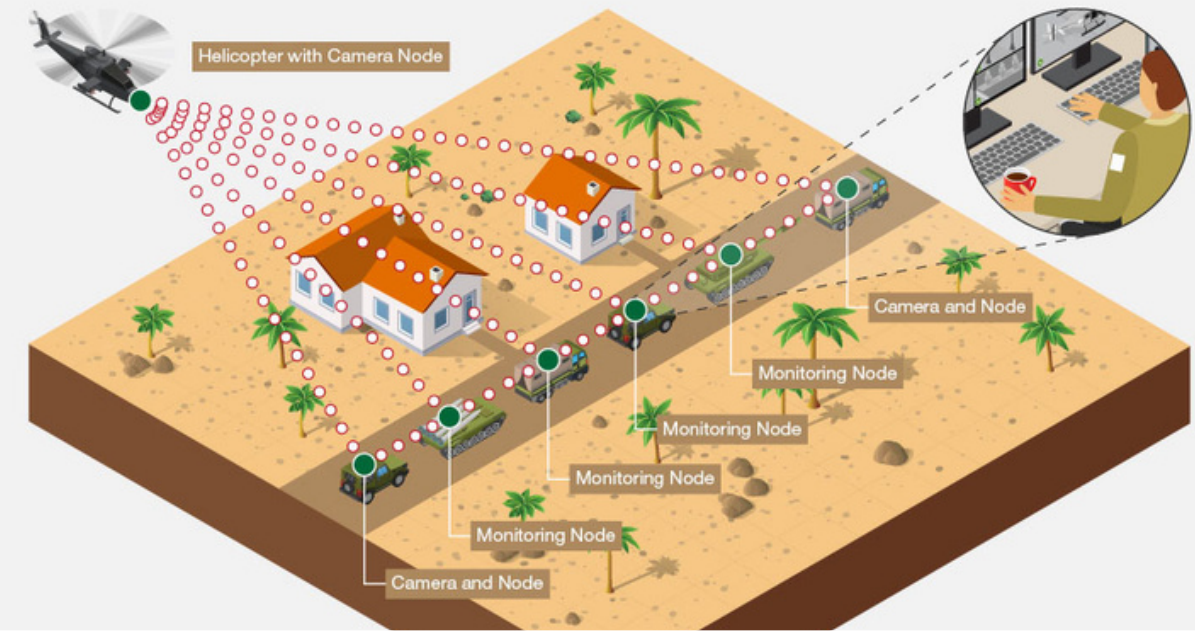
FIRE & RESCUE



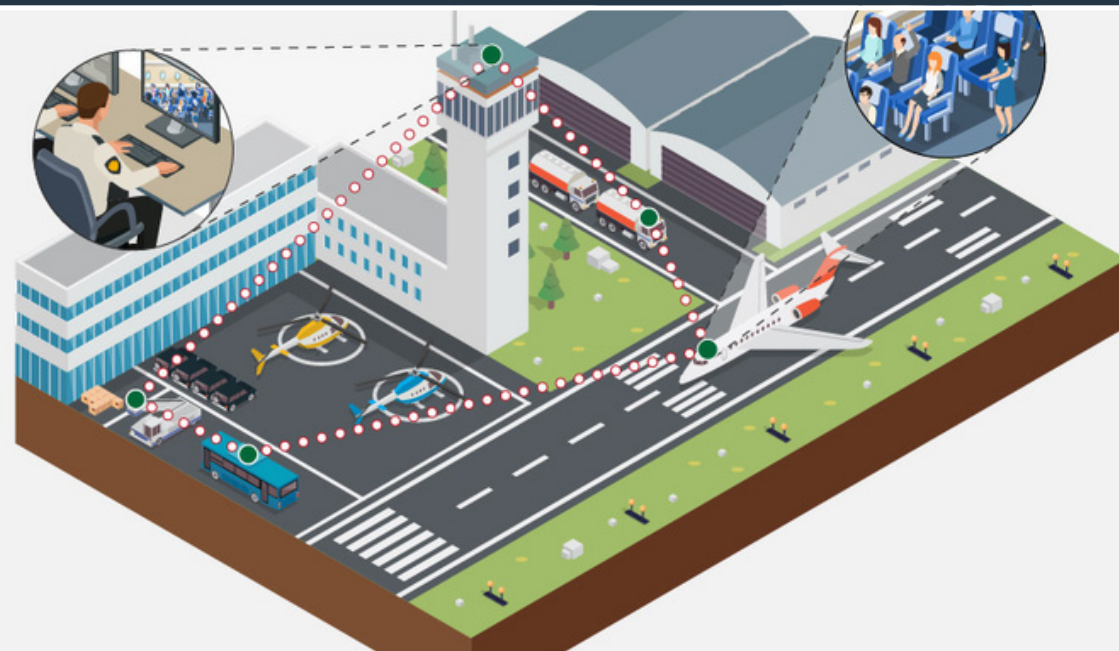
MARITIME



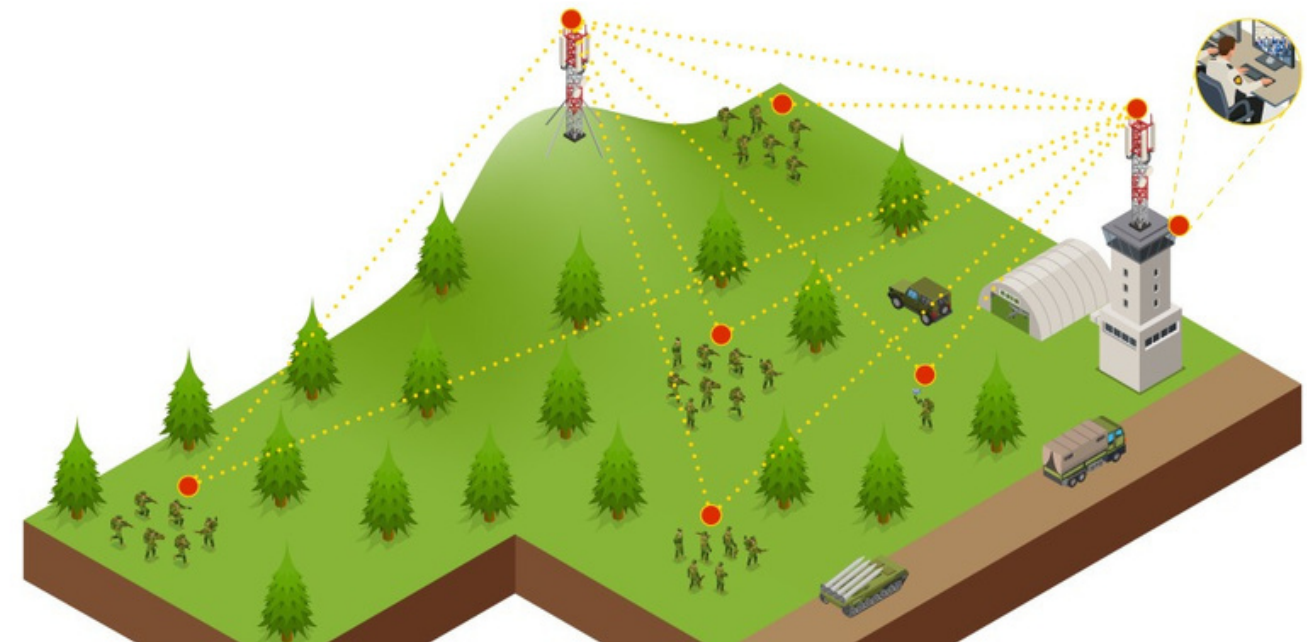
BORDER SECURITY



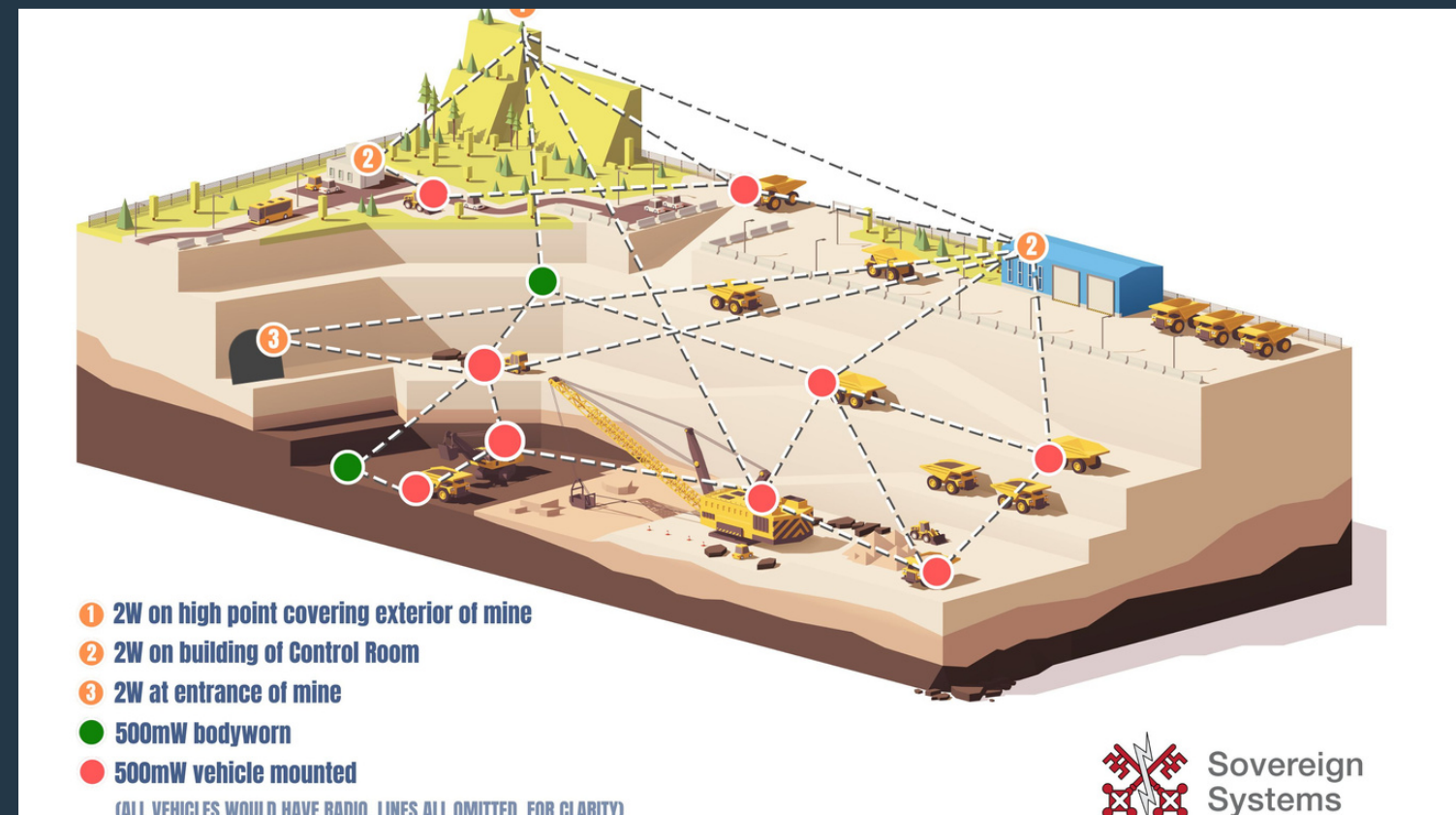
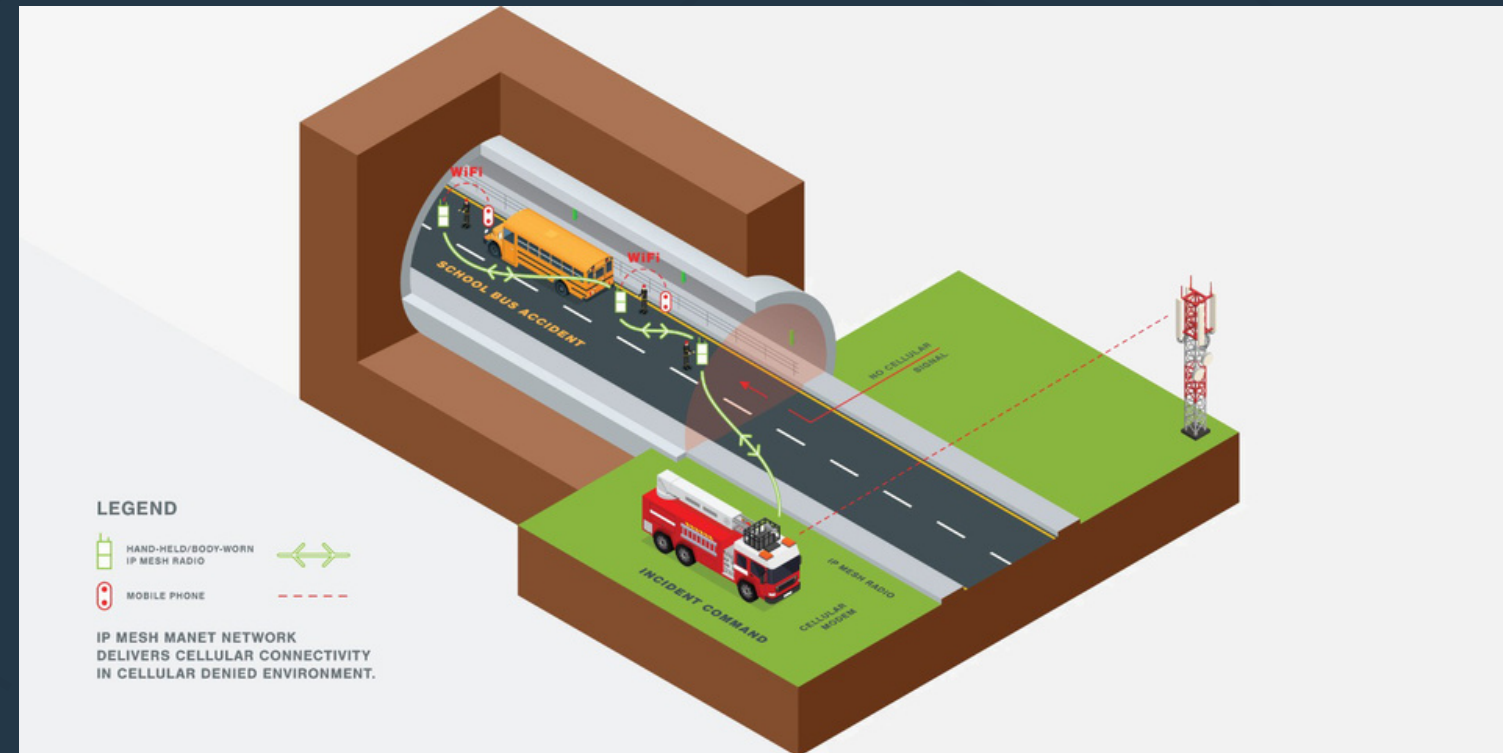
CONVOY



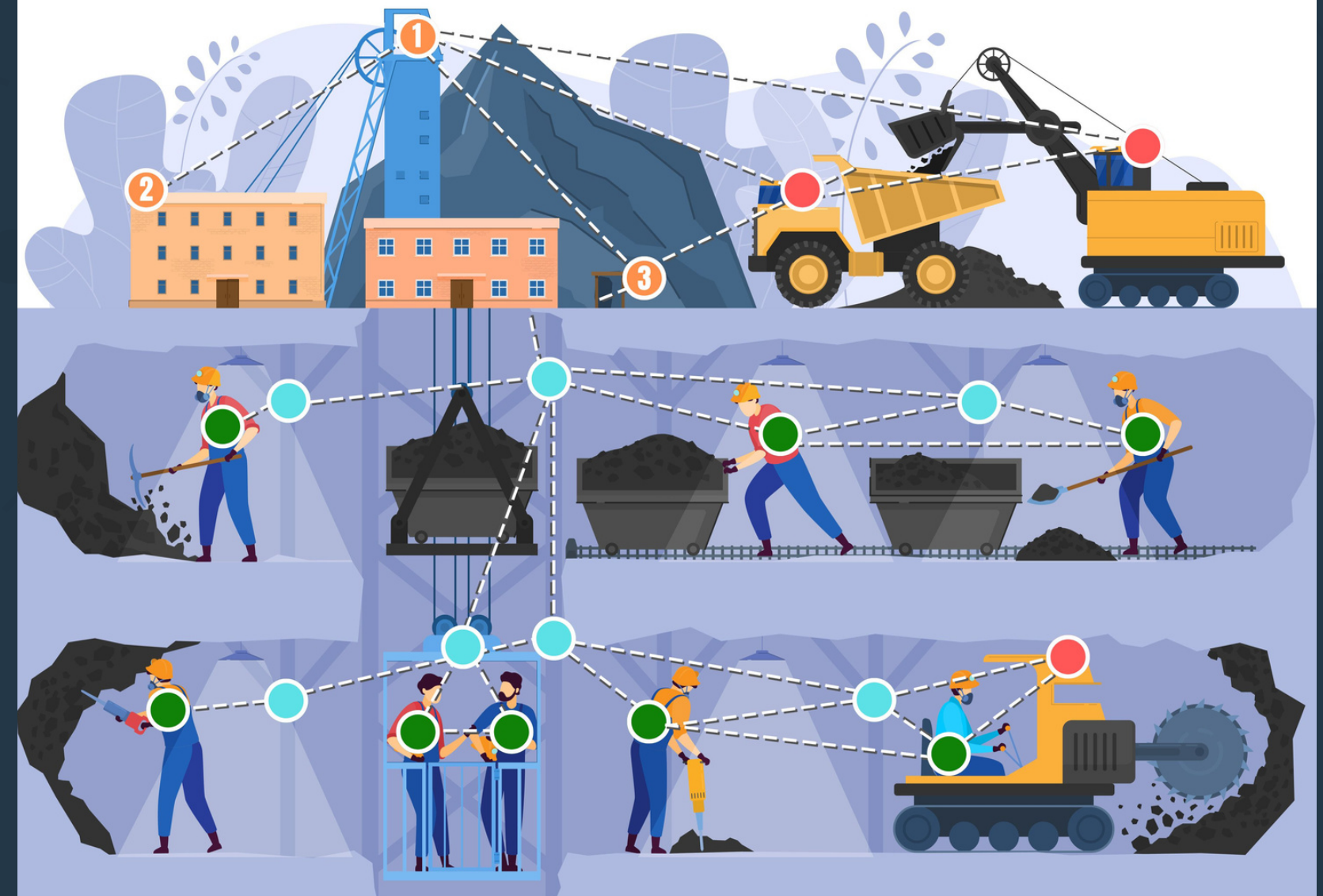
AIRPORT



MILITARY



IP mMESH RADIO NETWORK - MINE EXTERIOR AND INTERIOR



- 1 2W on high point covering exterior of mine
- 2 2W on building of Control Room
- 3 2W at entrance of mine
- 2W at various points in the horizontal and vertical shafts
- 500mW bodyworn
- 500mW vehicle mounted

NOT TO SCALE!



OUR 500MW PTT

HANDHELD RADIO

THE PTT 500MW RADIO

OUR MOST POPULAR FORM FACTOR

The **PTT (Push-To-Talk) mMESH™** radio is our latest product that caters to a segment that require handheld mMESH™ product but does not require the higher-end specs of the Robust Body-worn mMESH™.

This model is highly suitable for search and rescue operations, marine surveillance and protection, border patrol, city patrol, law enforcement, disaster first responder application, remote area PTT applications like mining/oil/gas/logging etc.

This new model comes with a simplified keypad for easier use and menu navigation. Like the MK1 model, it includes built-in WIFI and GPS.

The PTT MK2 mMESH™ can connect with all present mMESH™ models and is backward compatible with earlier models as well.

Features

- IP Design
- Intelligent Routing
- Ease of Operation
- Advanced Encryption
- Light-Weight
- Compact
- WiFi access point



PTT 500MW RADIO SPECS

RF Specifications

Waveform	COFDM
Frequency Range	UHF, L-Band, S-Band, C-Band
Carrier Bandwidth	0,8* / 2.5 / 5 / 10 MHz
Max Throughput	28Mbps
RF Output	0.5W
Carrier Modulation	QPSK, 16QAM, 64QAM, 256QAM
FEC Rate	FEC 1/3, 2/3
Receive Sensitivity	-100dBm @ 5Mhz
RF Interface	2x SMA (1x Tx + Rx, 1x Rx)

Power

Power Input	7.6Vdc battery
Power Consumption	9.1W

Physical Specifications, Environment

Dimensions (LWH)	150 x 67 x 40mm
Weight	450g
Operating Temp.	-20 to 50C
IP Rating	IP54

* T.B.C./ Under Development ** License Required

RF Specifications

Protocol	UDP, RTSP, RTP
-----------------	----------------

Networking

Ethernet	10 / 100Mbps
WiFi	2.4 / 5.0GHZ

Audio

Audio Codec	Adaptive Multi-Rate (AMR)
Data Bitrate	4.8Kbps

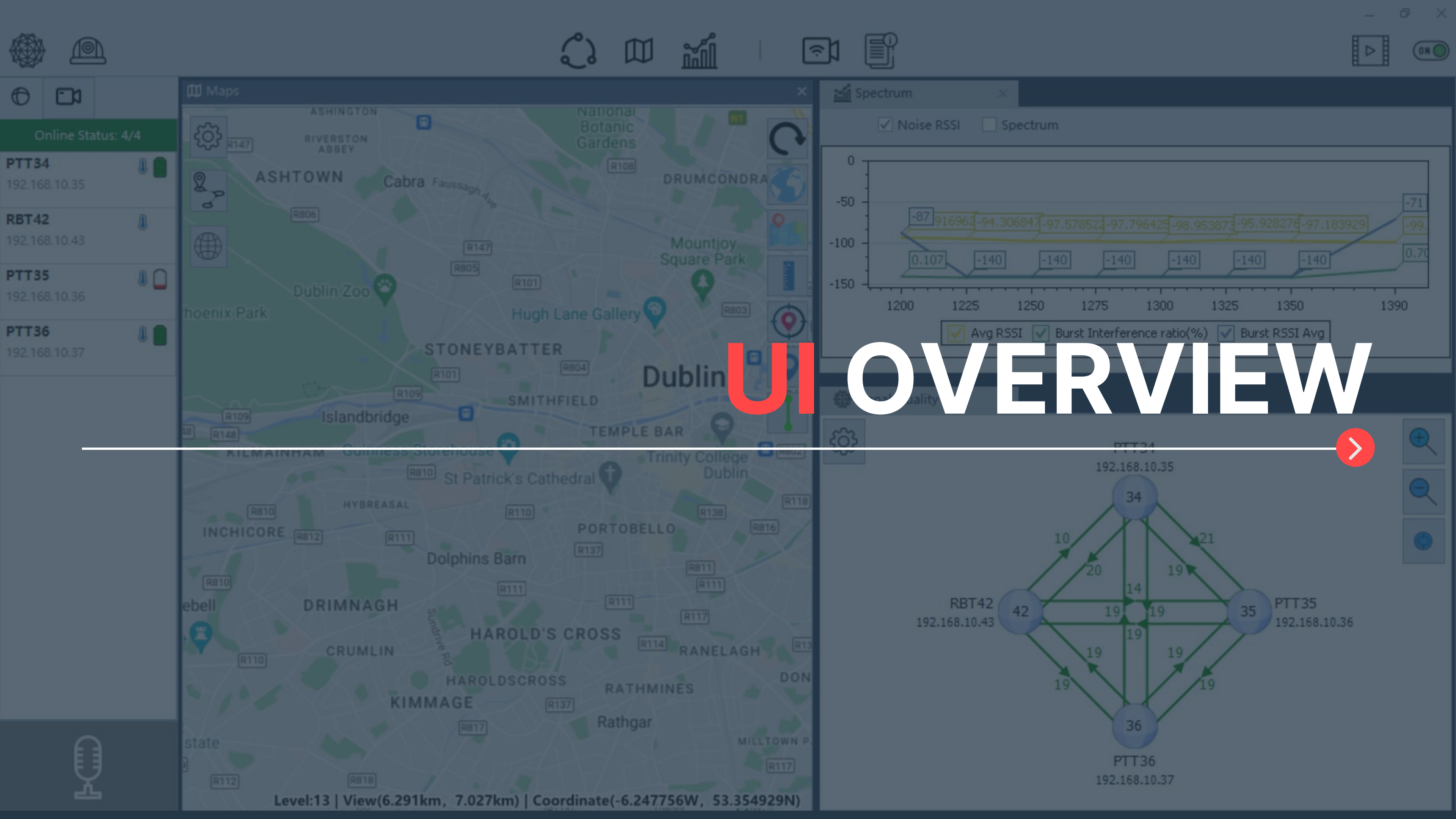
I/O

RS232, RS485, TTL, SPI, GPIO, Ethernet, USB

Security

Data Encryption	DES / AES 128 **/ AES 256**
------------------------	-----------------------------





UI OVERVIEW

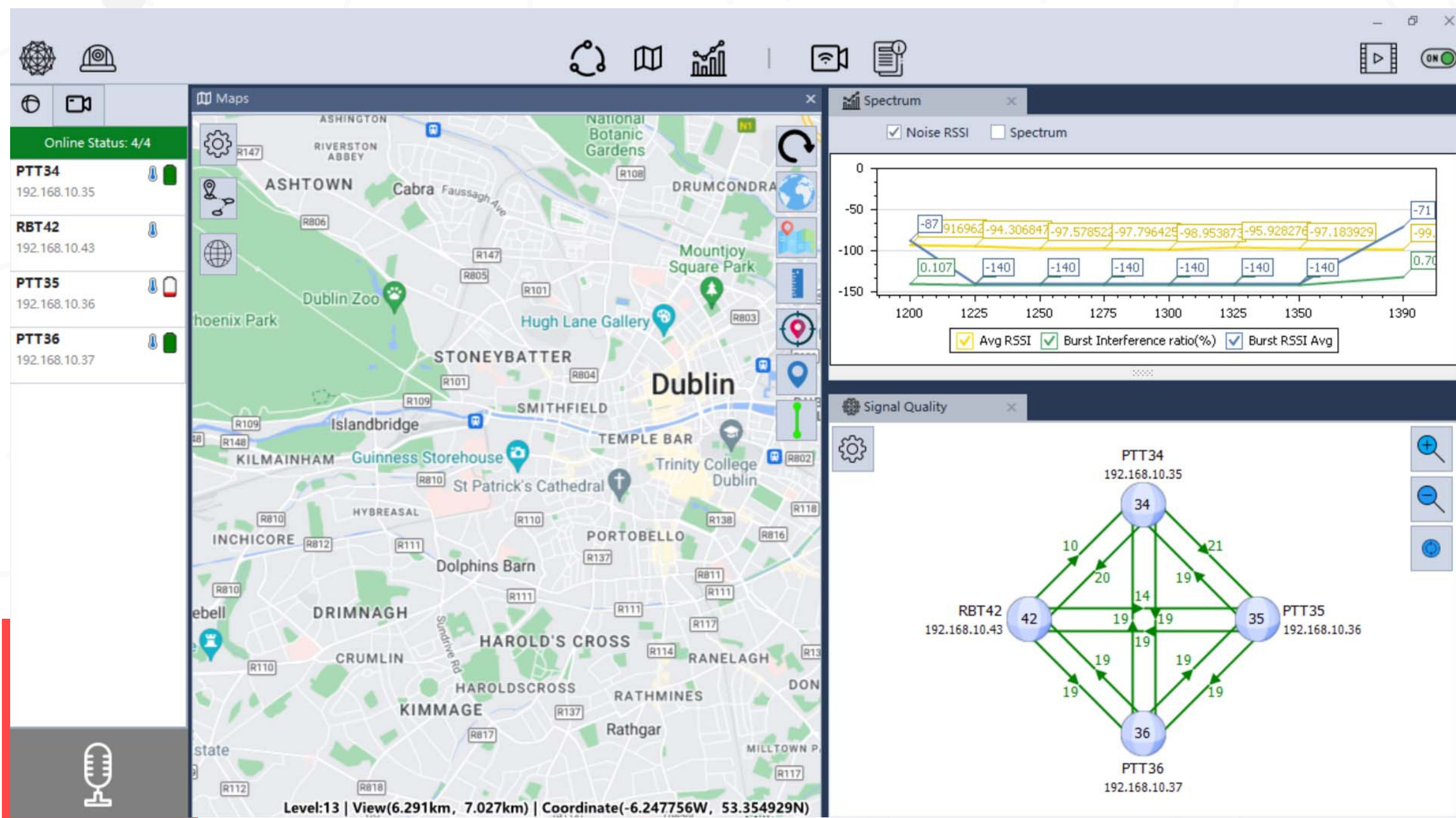


MAIN UI SCREEN

The UI runs on a Windows desktop/laptop/ tablet.

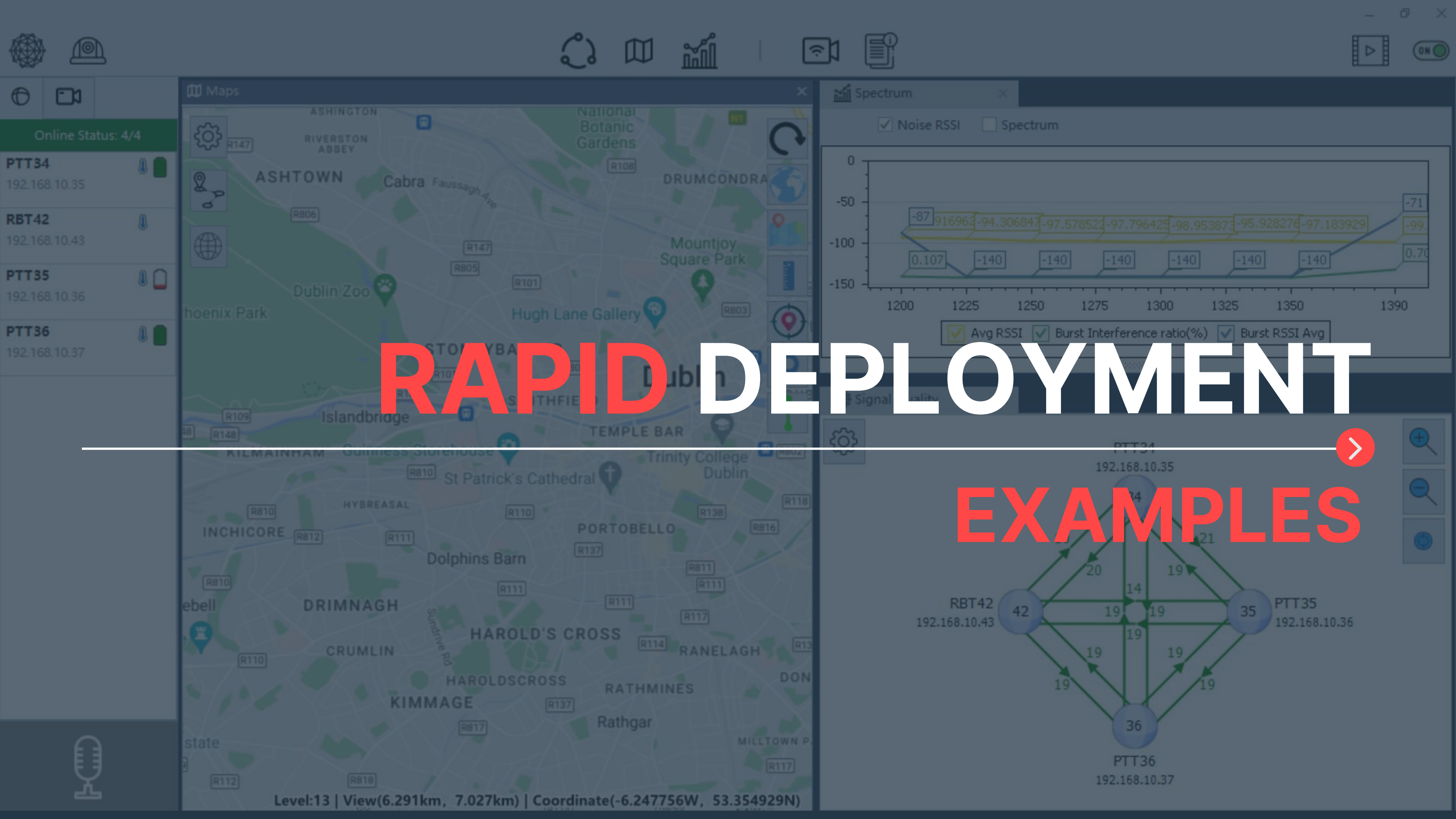
The UI does not need to be running for the mesh to be active. After radio configuration (if not done on radio LCD itself), the function of the UI is to stream video, view SNR, frequency strengths and view location of radio on the map when GPS available.

A browser (scaled down) UI is also available for radio configuration.



Video Walkthrough of UI

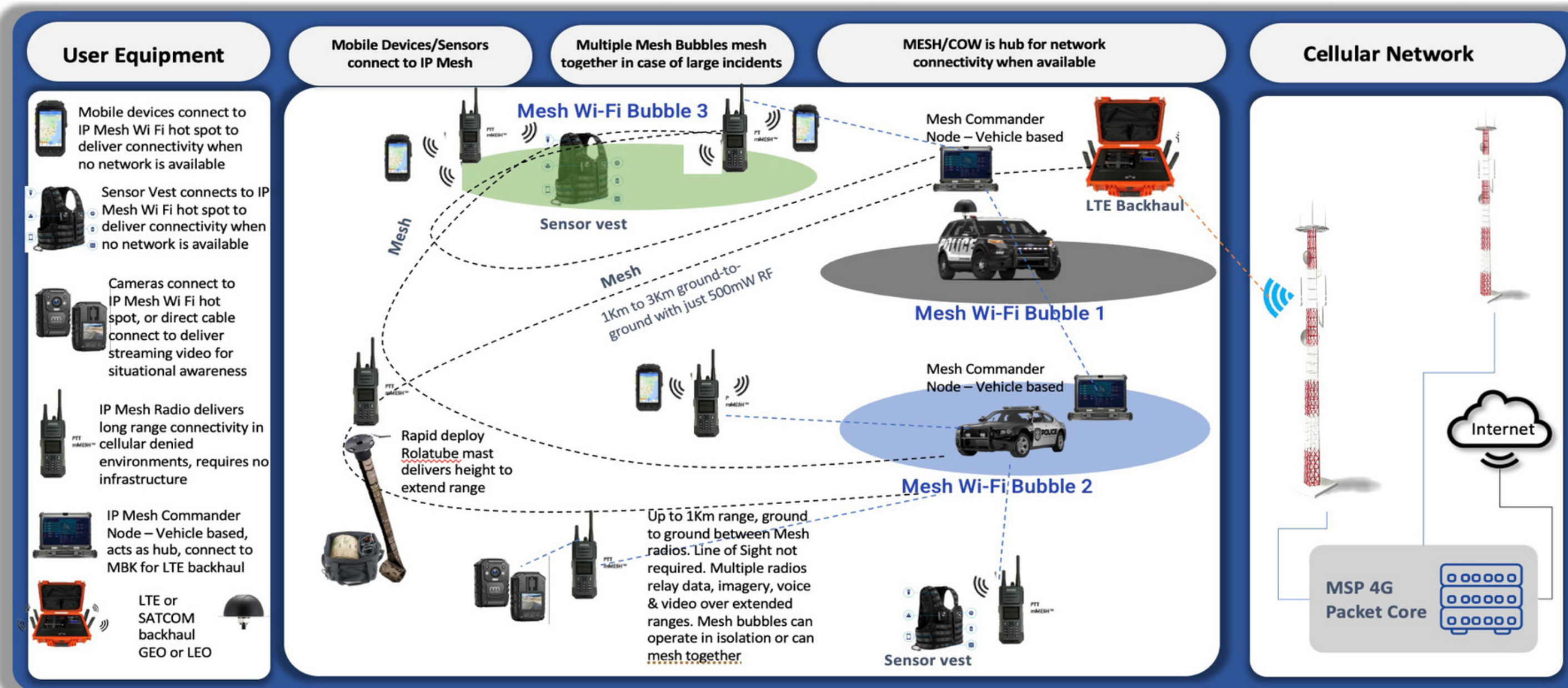
<https://sovdatasys.co/mmesh-ui-walkthrough>



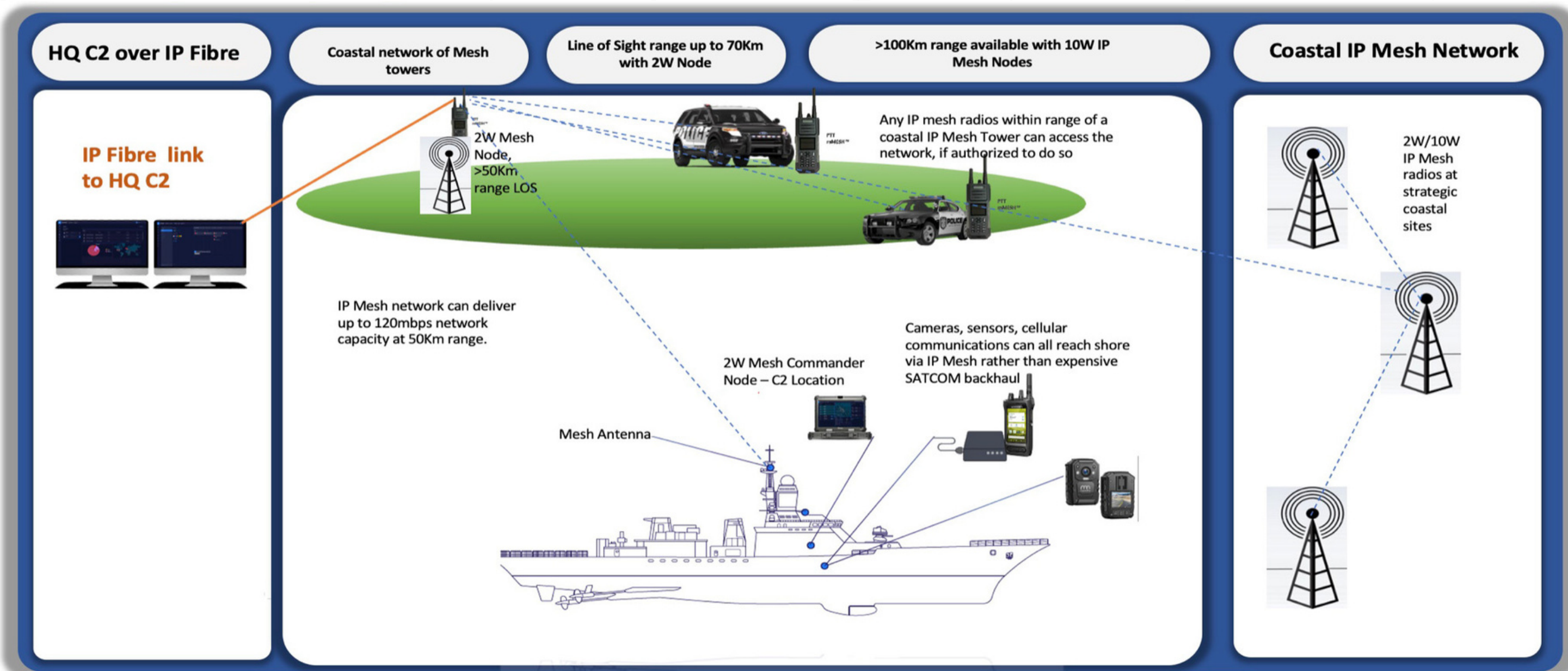
RAPID DEPLOYMENT

EXAMPLES

RAPID DEPLOYMENT IP MESH ARCHITECTURE



RAPID DEPLOYMENT MARITIME COASTAL ARCHITECTURE



COMMON QUESTIONS

The background features a close-up, slightly blurred image of a handheld radio. A large, semi-transparent question mark is overlaid on the right side of the image. The text 'COMMON QUESTIONS' is centered horizontally across the middle of the image. Below the text is a white horizontal line that ends in a red circle containing a white right-pointing arrow.

WHAT ARE THE DIFFERENCES BETWEEN MESH AND TRADITIONAL RADIO?

Mesh radio and traditional radio are both methods of transmitting radio signals, but they differ in several ways:

- 1. Network Topology:** In traditional radio networks, communication occurs between a central base station and individual radios. In contrast, mesh radio networks use multiple radios that communicate with each other, forming a mesh-like network. This allows for more flexibility in the network and greater redundancy in case of a node failure.
- 2. Signal Propagation:** Traditional radio networks use point-to-point or point-to-multipoint communication, where the radio signals are sent directly between two radios or from one radio to multiple radios. In mesh networks, the signals are relayed between multiple radios, allowing for greater coverage and range.
- 3. Scalability:** Mesh radio networks are typically more scalable than traditional radio networks because they do not rely on a centralized base station. This means that more radios can be added to the network without the need for additional infrastructure.
- 4. Reliability:** Mesh radio networks are more reliable than traditional radio networks because of their redundant architecture. If one node fails, the network can automatically re-route traffic through another node, ensuring continuous connectivity.

Overall, mesh radio networks offer **greater flexibility, scalability, and reliability** than traditional radio networks, making them ideal for applications such as disaster response, industrial automation, and smart cities.



WHAT IS COFDM AND WHY USE IT?

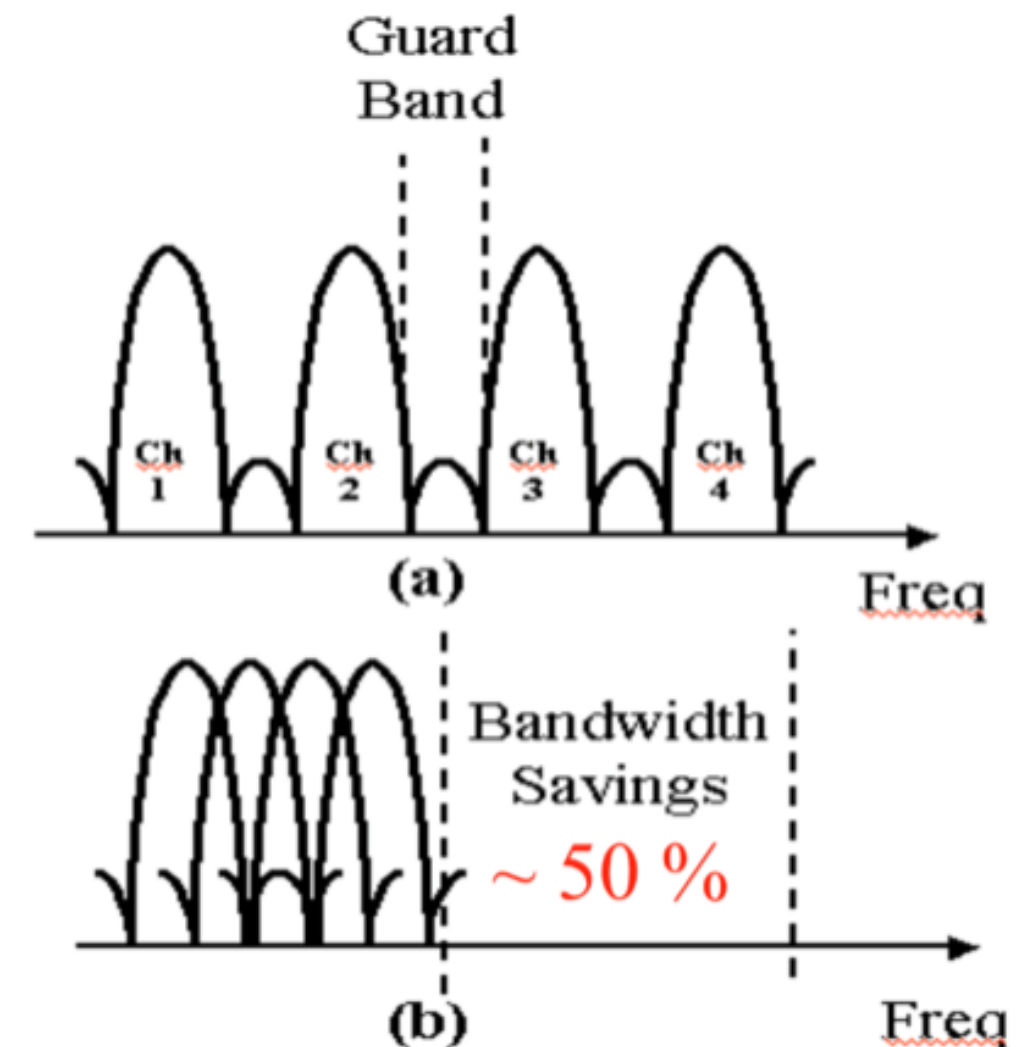
COFDM (Coded Orthogonal Frequency Division Multiplexing) is a **digital modulation technique** used in wireless communication systems, particularly in broadcasting and data transmission applications.

COFDM works by splitting the data stream into multiple subcarriers, each of which is modulated with a separate QAM (Quadrature Amplitude Modulation) or PSK (Phase Shift Keying) signal. The subcarriers are then combined into a single composite signal for transmission.

One of the key advantages of COFDM is its ability to cope with multi-path interference, which is a common problem in wireless communication caused by signals reflecting off obstacles and arriving at the receiver with different time delays. COFDM uses coding techniques to distribute the data over multiple subcarriers, which are spread out over the available bandwidth. This redundancy allows the receiver to recover the original data even if some of the subcarriers are lost or distorted due to interference.

COFDM is used in a variety of wireless communication systems, including digital television broadcasting, satellite communication, and wireless local area networks (WLANs). It is also used in some public safety and military communication systems due to its robustness and ability to operate in challenging environments.

Unlike standard OFDM, COFDM requires no guard bands for subcarriers = 50% reduction in bandwidth. Robustness against multi-path propagation: Use a Long Symbol Period w/ respect to speed of light (RF Propagation) Guard Interval (GI) – Used correctly mitigates Inter-Symbol Interference (ISI) Addition of Pilot carriers to help with demodulation of digital transmission.



WHY DOES THE RADIO HAVE WIFI?

Each mMESH™ radio is its own **WiFi access point**, and up to **6 devices** can connect to each radio.

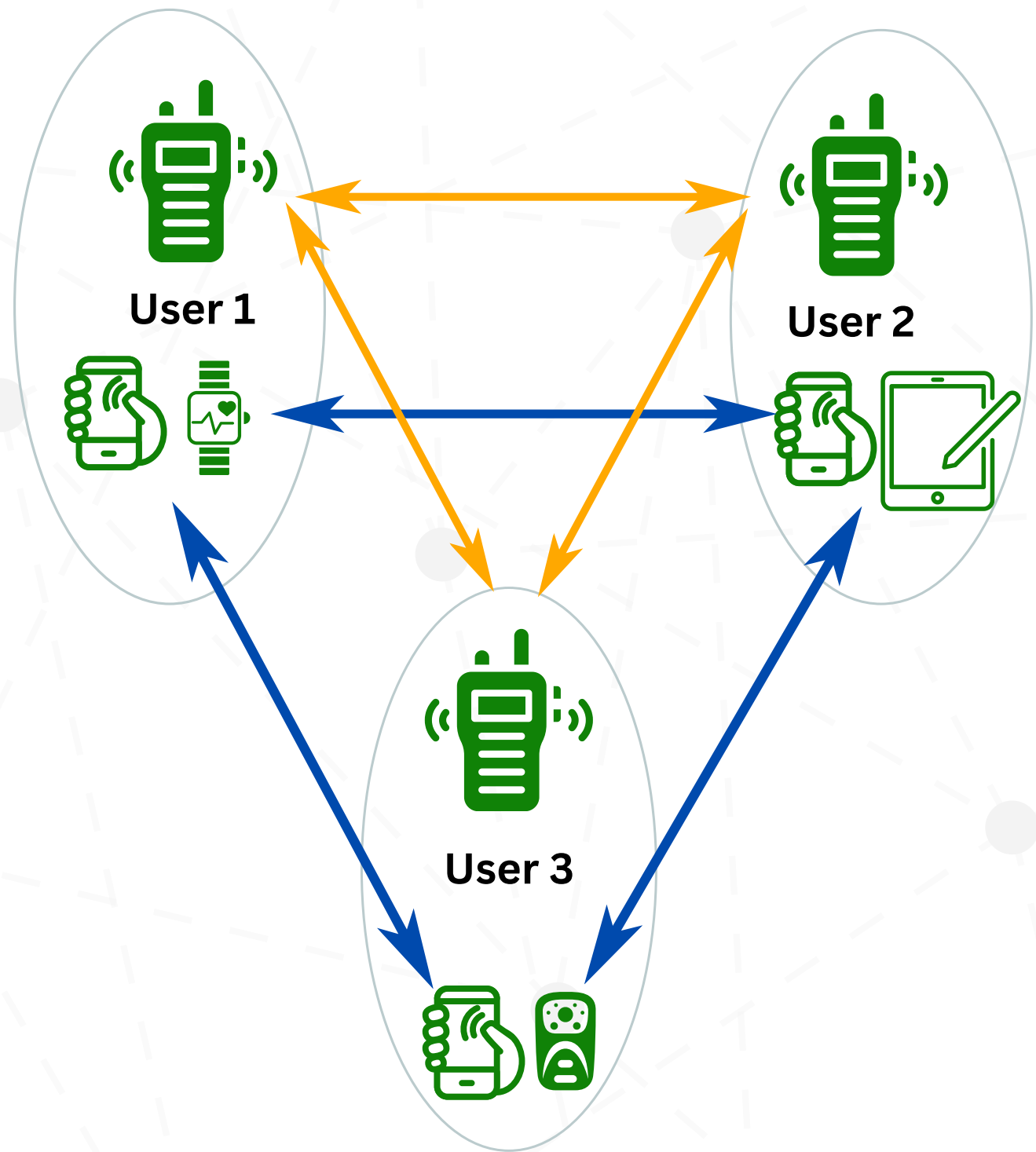
Why connect via WiFi?

- Access the **UI when LAN cable not available**, no network port on device, or when not appropriate, e.g. in covert situations
- Access **scaled down UI on smartphone**
- Connect a smart phone to use **3rd party applications**, such as
 - **PTT app** - for example a unit of 5 can communicate where there is one mesh radio, and each member has a smartphone connected to the mesh radio WiFi
 - **RTSP camera** (app) - a video feed can be sent back to the UI, whether its a dedicated camera, or app on the users smartphone
 - **Tactical awareness** applications
 - Connect your device for your own needs such as sending data back from sensors for local environment, heart beat, heat, etc.

Having a wireless network allows the sending of data between devices (smartphones/tablets/any WiFi capable device) connected to the radios.

With additional equipment such as a **cellular modem, enables the sending of data to external destinations outside the mesh network, or giving devices connected to the mesh radios cellular capability.**

LOCAL WIFI NETWORK VIA MESH



As explained, each mMESH™ radio is its own **WiFi access point**, and up to **5 devices** can connect to each radio. Other device information can now be shared from mesh bubble to mesh bubble, and out to internet if cellular modem added to mesh.

Note: There is no mMesh app for smartphone (there is scaled down browser UI), all devices connected to the WiFi use third party applications and services. We use and recommend many so get in touch if you are looking for something in particular.



Standard mesh network communications



Communications between smartphones, tablets etc. via the mesh networkj



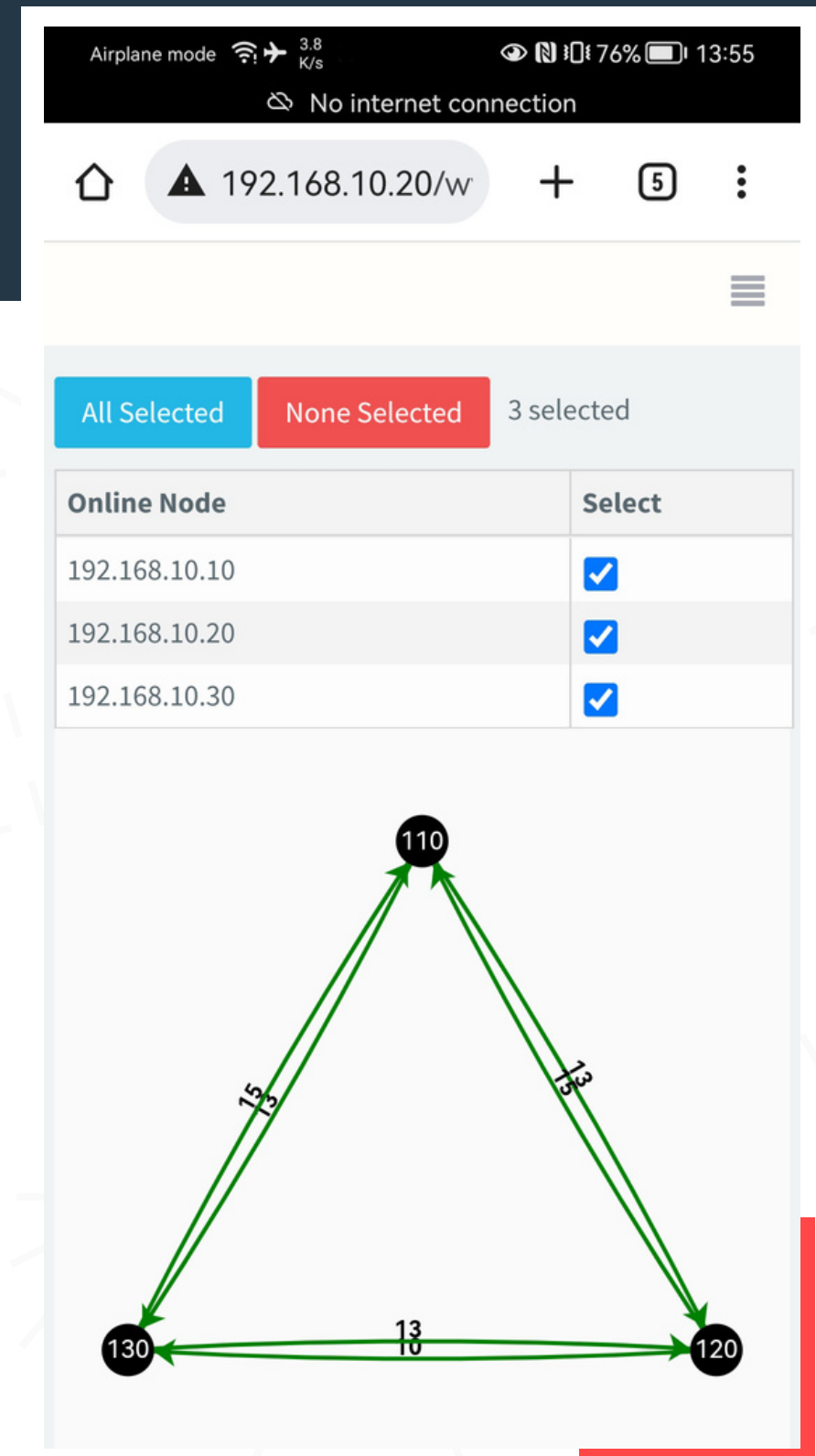
WiFi connection

SMARTPHONE UI

ALSO USABLE ON PC BROWSER UI

There is a **scaled down UI** accessible via a browser - on smartphone, or laptop/tablet.

This is a very useful option for some users and scenarios. SNR will now be visible so user can monitor if they are going out of range, especially in scenarios of comms silence, or additional team members can monitor and fill potential gaps.



SNR screen on smartphone showing signal strength between three nodes/radios

QUICK QUESTIONS

WHAT IS THE ENCRYPTION ON THE RADIOS?

The radios come with DES as standard with options for upgrading to AES128 and AES256.

WHAT IS THE MAX HOPS THE RADIOS CAN DO?

The max hops the radio can do depends on the band in use:

- Narrowband - 250khz/500khz/1000khz: Max hop: 6
- Wideband - 1.25Mhz: Max hop: 8
- Wideband - 2.5mhz/5Mhz/10Mhz: Max hop: 31

WHAT DOES SELF HEALING MEAN?

Self-healing refers to the ability of the network to automatically reconfigure itself in the event of a node failure or other disruption to the network. When a node fails or is removed from the network, self-healing allows the remaining nodes to automatically establish new communication paths to maintain network connectivity.

WHAT IS SELF FORMING?

Self-forming refers to the ability of the network to automatically configure itself without the need for manual configuration or setup. When new nodes are added to the network, self-forming allows them to automatically discover and join the network without any manual intervention.

WHAT FREQUENCIES ARE AVAILABLE?

320 to 420 MHz 450 to 670 MHz
1000 to 1500 MHz 1650 to 1900 MHz
2000 to 2500 MHz 4800 to 5000 MHz
5500 to 6000 MHz (2W radios only)



WHAT OTHER TYPES OF NODES ARE THERE?

JUST SOME OF OUR NODE OPTIONS

HIGH POWER ROBUST mMESH™ (available in 2W and 10W)

The High Powered mMESH™ node is designed for infrastructure applications like telecom infrastructure redundancy, mobile backhaul infrastructure, remote area connectivity, private security networks etc. This product is also widely deployed in the marine and oil & gas sector, as well as used in specialised vehicles.

ROBUST BODYWORN mMESH™

The Robust BWM MKII is designed for tactical and spec-ops application, where mission-critical all-round communication is required for the success of the operation. The mMESH™ network will allow 2-way IP communication between the Operation Commander and the tactical unit(s).

PTZ CAMERA mMESH™ (& DOME CAMERA)

The PTZ Camera is integrated with a 2W mMESH™ radio, allowing IP video to be transmitted and viewed live at the Command Node. As a mesh node, the PTZ Camera can mesh with any of ACE6 mMESH™ products.

QUICK DEPLOY mMESH™ (& QUICK DEPLOY LITE)

The Quick Deploy mMESH™ (or QD mMESH™ for short) is developed for quick machine-to-machine integration, for example unmanned platforms and robotics, or integration with other communication products. Built with a 500mW power amplifier, this products is part of the mMESH™ family and can mesh with all other mMESH™ products.

mMESH™ OEM CORE MODULE

The OEM core module is the main building block for mMESH™ products. Please contact our sales personnel to learn more of the mMESH™ core module



ROBUST BODYWORN MESH

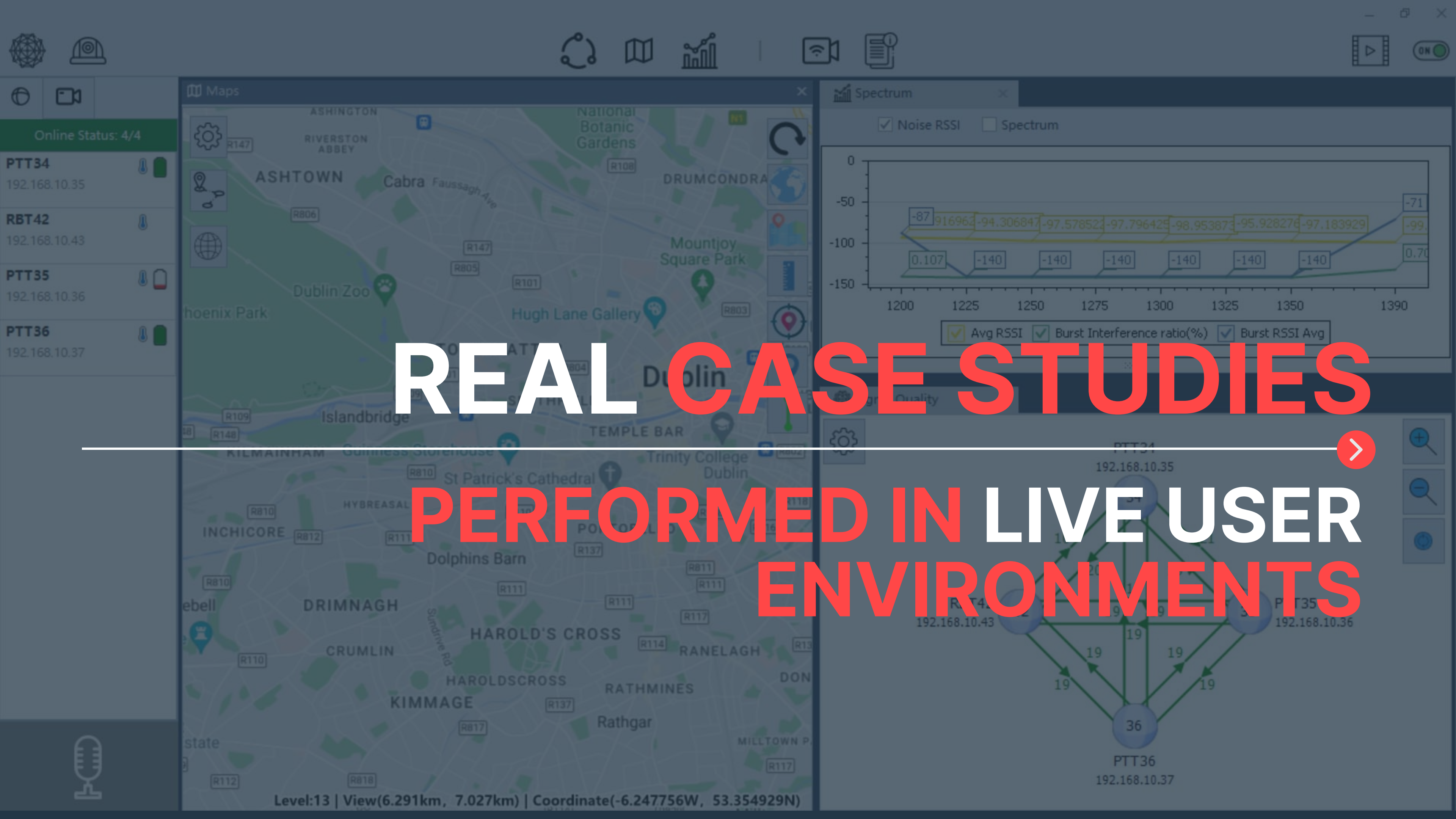
ONE USAGE OF OUR NODE AND ADD-ONS

HIGH POWER ROBUST 2W Body-worn mMESH™

The High Powered bodyworn node is designed for vest/harness wear with the addition of numerous add-ons, wired, wireless or combination.

Our 500mW PTT handheld can also be deployed for the same usage.





REAL CASE STUDIES

PERFORMED IN LIVE USER ENVIRONMENTS

REAL CASE STUDIES

PERFORMED IN LIVE USER ENVIRONMENTS

- Paris Catacombs – with **French Police Nationale** and **BRI** (Counter Terrorism Commando)
 - **UN Urban Heavy Lift SAR** trials in collapsed structure training ground, Abu Dhabi
 - World Trade Centre, Abu Dhabi, 92 story building with 6 underground basement floors – live video trials with **UN SAR**
 - Underground and remote coastal/lakeshore area **Search & Rescue** in Australia and California
-

REAL CASE STUDIES

PARIS CATACOMBS - FRENCH POLICE NATIONALE AND BRI

The tunnel was barely 2 metres in height and about the same in width. Wearing the Wearin' sensor vest (which needs network connectivity at all times) and with one PTT Mesh radio on the surface connected via the integral Wi Fi access point, to the Wearin tablet dashboard, using 2.5MHz bandwidth, we achieved and exceeded the objective of 100 metres penetration along the underground tunnel, while operating the Wearin' sensor system. We used one radio as a relay at the top of the spiral stairs and then deployed a further two radios as relays in the tunnel, which curved considerably along the route. All radios used only 500mW RF output power.

We then switched waveforms on the radios and engaged the ultra-narrow-band 300KHz bandwidth. Developed for PTT voice and low data rates at extreme range and penetration, we needed only 3 radios, including the radio at the surface, to achieve 200 metres connectivity along the tunnel, much to the satisfaction of the end user.

Preparing for the Rugby World Cup next year, and the Olympics the following year, law enforcement agencies need to be sure they can communicate effectively in any environment that could present a threat.

The standard DMR radios lose connectivity within about 10 metres of heading down the extremely narrow, tight concrete spiral stairs to the catacombs, 20 metres below the street and, of course there is no network connectivity either.



UN URBAN HEAVY LIFT SAR

ABU DHABI

On the Search & Rescue disaster management training site, there is a collapsed building, and within this structure there is a concrete crawl tunnel, 1.2 metre square. The challenge was to transmit audio from the tunnel, with the trapdoor closed. All previous attempts by other communications and IP Mesh vendors had failed.

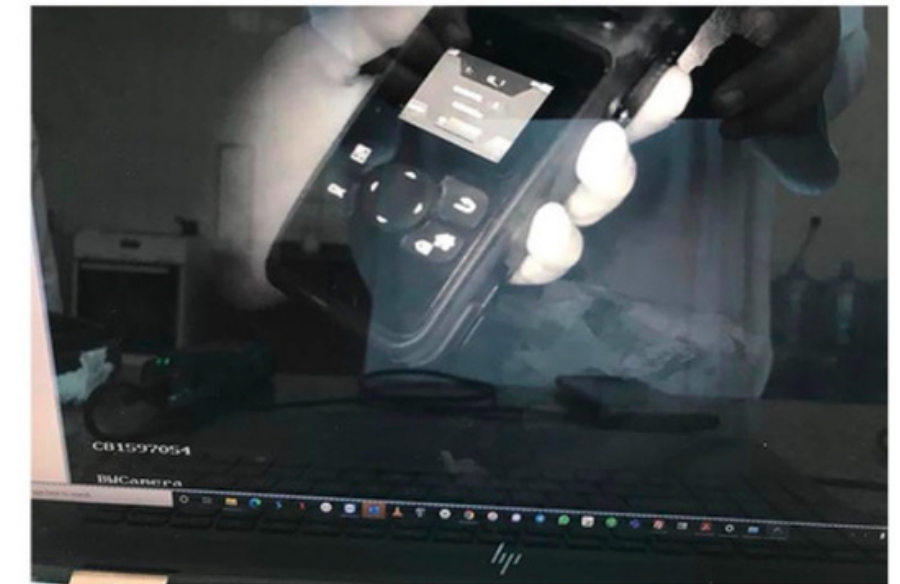
Not only did we succeed in transmitting audio over the PTT Mesh radios but we also delivered video, to the surprise, and delight, of the end user. None of the radios used in this exercise exceeded 500mW RF power, and some of them were operating at only 250mW. This is testament to the superior digital signal processing of the Ace6 technology.

We also proved the superior RF performance in closed 40' shipping containers, and within metal elevators, from the 10th. floor to ground, with no interruption in PTT Audio and video transmission. The user kept pushing us to perform in conditions where they had previously been unsuccessful with all previous communication systems....and we performed!!



On the Search & Rescue disaster management training site, there is a collapsed building, and within this structure there is a concrete crawl tunnel, 1.2 metre square.

The challenge was to transmit audio from the tunnel, with the trapdoor closed. All previous attempts by other communications and IP Mesh vendors had failed.



Live video screenshot from inside the sealed tunnel, using:
2.5MHz bandwidth, 4.9GHz frequency, 500mW RF output, antenna gain 1dBi

MESH CAPABILITIES IN SKYSCRAPER

Following a quick survey of the ground level and basement access, we decided to use the emergency exit stairwell as the transmission path from B6. There were many right angles between the Security Control Room and the entrance to the stairwell so a relay radio was placed to ensure connectivity to the top of the stairwell.

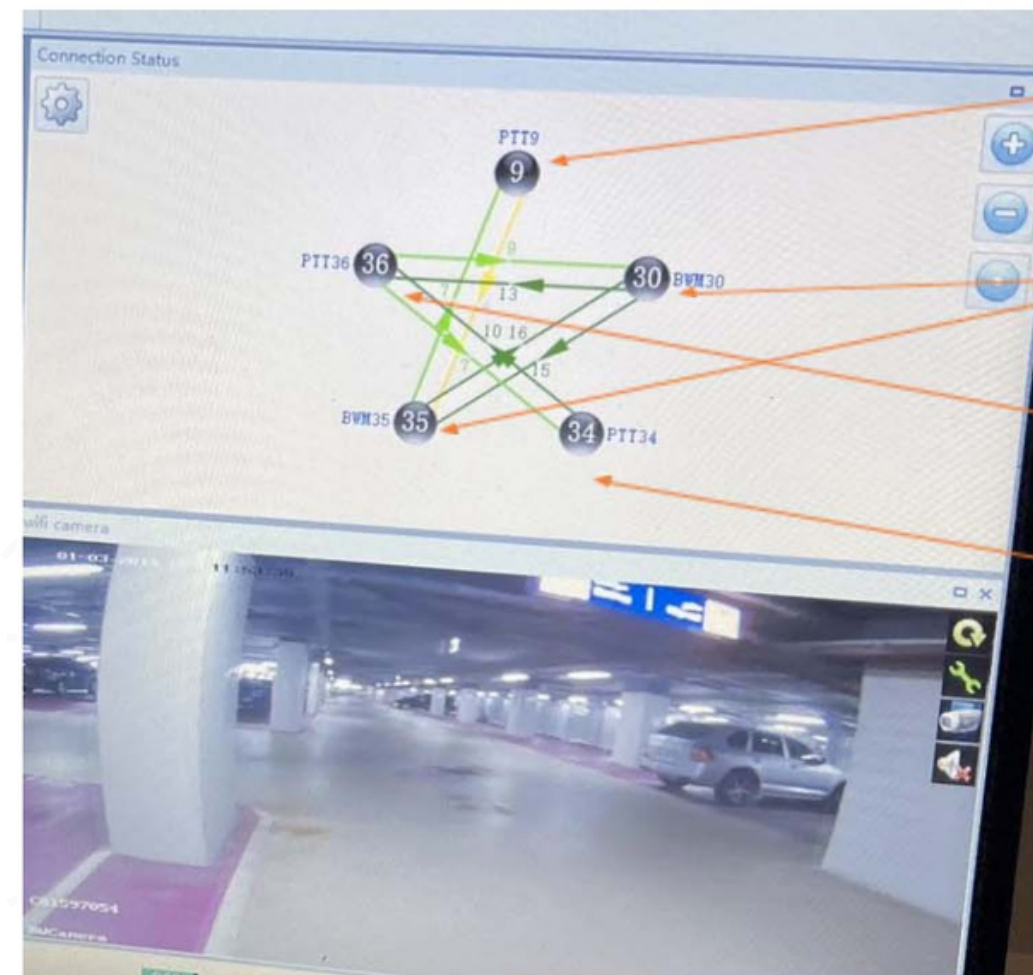
We required only 2 further “hops” to the bottom of the stairwell, with the second hop at the start of a 60 metre long “tunnel” to the door leading in to the B6 car park. The objective was to deliver live video from deep within the car park and not just from the entrance to the car park at the emergency exit stairwell.

For the rooftop test we decided to position the BWM30 outside, at Ground floor level, to provide connectivity from the rooftop radio to the C2 station in the Security Control room. We left the other radios in the stairwell while doing the rooftop test just to show the mesh performing across all extremes in the building.

This demonstrates the superior digital signal processing of the Ace6 Technology IP Mesh technology, with only 500mW of RF output power.

In a 92-story building, with 6 underground basement parking levels, customer required live video transmission, along with clear PTT voice comms, from the B6 parking level and from the 92nd roof top level. The floors in the basement parking levels are 3m thick concrete. The customer wanted only battery-operated radios and as few relay radios as possible.

The C2 location was in the Security Control Room, at the lobby level, with window to the plaza outside.



PTT9 – Mesh radio with Wi Fi connected camera.

BWM30 & BWM35 - Stairwell Relay Mesh radios

PTT36 - Ground floor relay to cover many right angles

PTT34- Control radio attached to laptop

Video screenshot from B6 basement car park

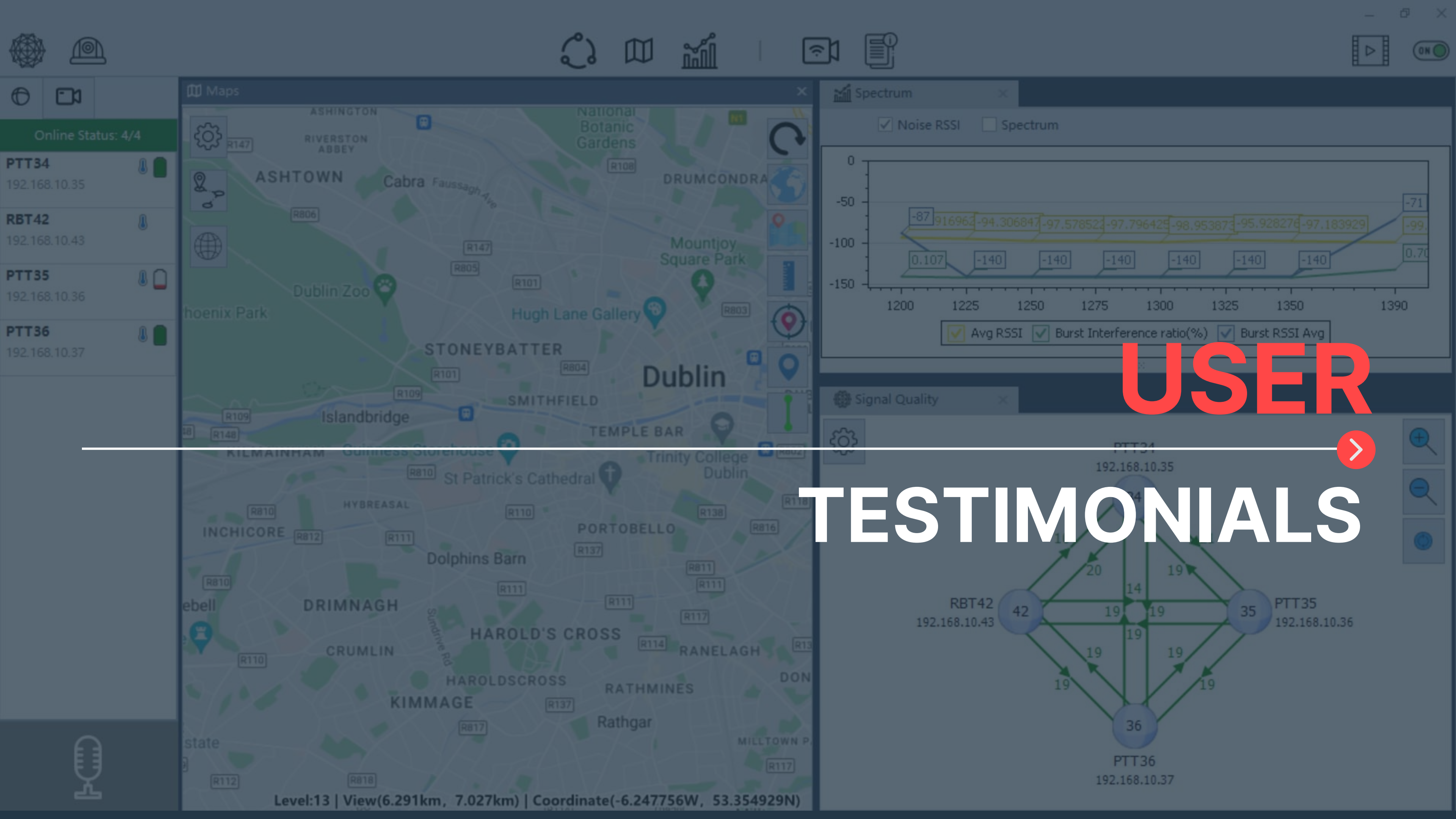
THE SOVEREIGN SYSTEMS MESH DIFFERENCE

To recap the benefits of our mesh solution:



- **World's smallest hand-held IP mesh radio**
- **Superior digital signal** processing, using twin transmitters and receivers
- Wideband **COFDM** and ultra-narrow band COFDM waveforms on the same FPGA
- 20MHz bandwidth for **high quality video/data** & 250KHz bandwidth for incredible range
- **Frequency Hopping** Spread Spectrum
- **Intelligent Anti-Jamming**
- **STDMA** for maintenance of data throughput in "chain" networks
- **128 Nodes** in a single frequency Mesh, with 250 Nodes in development, while retaining the QoS benefits of the COFDM Token Passing algorithm.
- **MIMO**, with 120mbps network throughput, using 1024QAM
- **Integration** with
 - **Non-GPS indoor tracking** across 3 axes Thesia system
 - **Body-worn sensor systems**, providing network connectivity in network-denied environments

“ *The only Mesh radios to completely satisfy our demands was the Sovereign Systems mMesh radios* ”



USER

TESTIMONIALS

ANTI-HUMAN TRAFFICKING **NGO**

USAGE WITH **TACTICAL AWARENESS APP**

A team of ex-Special Forces operatives, going under the name of Samurai, has focused their skills on the fight against human trafficking. Samurai operates in some very dangerous locations, including conflict zones in the Caribbean, Asia and Eastern Europe. Communications is a constant challenge in these environments, with access to cellular networks being very patchy and SATCOM being impractical.

Samurai approached Sovereign Systems for a solution to their operational communications needs, with the challenge being to set up an independent network, with no reliance on comms infrastructure, but delivering the ability to share ATAK on mobile phones, and a PTT Voice capability. In addition, the network needs to be encrypted and the radios need to operate at distance, range being an important consideration.

Sovereign Systems delivered their PTT Mesh radio, the world's smallest truly Hand-Held Mesh radio to Samurai's staging location in the USA. Gerry, and his team, had never used Mesh radios before and they were under pressure to deploy. The time zone considerations meant that support from Sovereign Systems European HQ was the more practical option, with Singapore being out of time sync during the times Gerry and his team were available.

Samurai deployed into their operational zone. Little was heard over the first week but when Gerry came back online with us his comments were "these radios are incredible, exactly as Mike talked them up to be", with Mike being the initial Australian ex-SF member who made contact with Sovereign Systems. "From what I was cross trained on the ODA and knowing how repeaters work and mesh networks, this is the know all and be all and a great solution to our comms challenges.

We especially love the integrated GPS, and WiFi access point, so we can easily run ATAK natively in the local Mesh network without needing any external network access. We did not use the GUI provided by Sovereign as we did not have access to laptops or tablets, so we relied on setting up the network using just the LCD screen and keypad on the radios. I have never seen a Mesh radio this small before and initially I doubted its capability with only a 500mW RF output but the ranges we are achieving are beyond our expectations. Safe to say, the team and I are very impressed and we intend to keep using these radios in future deployments."

COMBAT USE **VALIDATION**

PTT AND **WIFI BUBBLE**

The Armed Forces of Ukraine are deeply grateful to Cradlepoint company of Ericsson, CS Comms Ltd, Double Trinity and to you personally for the support to Ukraine in its efforts to defend its sovereignty and territorial integrity and for the important shipments of specialized telecommunication equipment since the start of the Russian invasion. Currently the Armed Forces of Ukraine have received special mobile terminals iMESH MBK and have conducted verification of their operation jointly with telecommunication providers.

As a result of this practical verification, it has been established that the mentioned device is specifically adapted to working under the conditions of combat actions and has several important advantages, in particular: ability to work in networks of local mobile providers while the specified devices are impossible to detect in the network by the operator himself without carrying out any special measures and using additional equipment; receiving-transmitting path of the mobile terminal amplifies the signal by 20-25% in comparison to regular mobile devices; a compact protected case in which effectively the capabilities of a tactical-level field communication node are implemented; ability to connect the mentioned equipment to the protected servers which are already being used in the Armed Forces of Ukraine.

Given the aforementioned, the Command of the Signal and Cybersecurity Forces of the Armed Forces of Ukraine would like to confirm its interest in further cooperation regarding the expansion and adaptation of the mentioned capabilities into the communication system of the Armed Forces of Ukraine.

CS Comms and Double Trinity are our UK integration partners with UK MoD, all ex-Special Forces personnel.

Training of the Ukrainian and British Special Forces was provided by Sovereign Systems Ireland personnel.

iMesh is the special naming convention derived for the combination of the PTT Mesh radio and the cellular backhaul system, MBK.

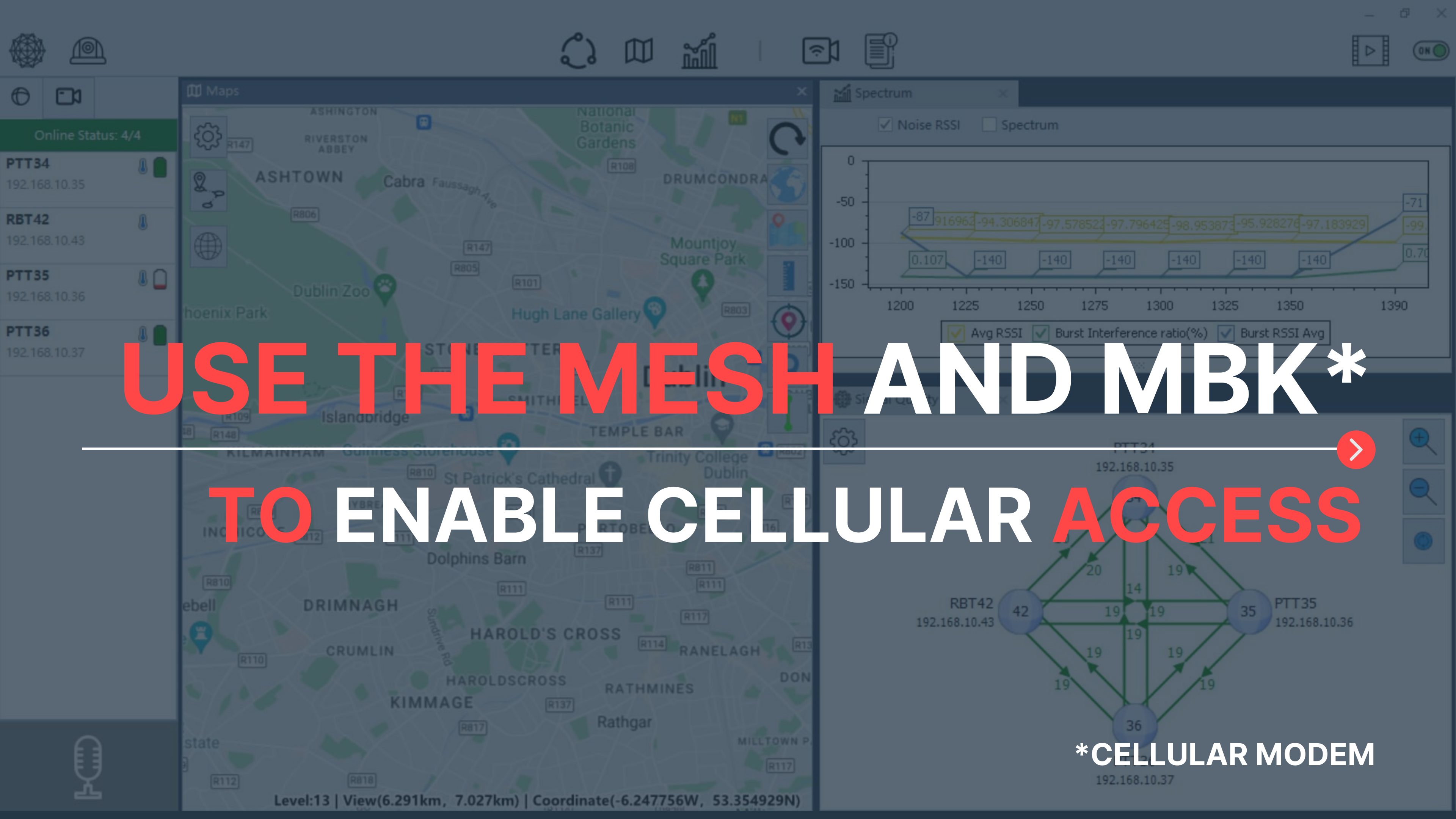
UAE UN HEAVY URBAN LIFT SAR UNIT

ABU DHABI

"We tested a number of Mesh technologies in Abu Dhabi, in very challenging RF environments, including in deep basements and in collapsed structure training simulations and the only Mesh radios to completely satisfy our demands was the Sovereign Systems mMesh radios.

We streamed live video, audio and data across the Mesh network and we were very pleased with the performance from such a small, easy to deploy Mesh radio."

~ **Major Rashid Al Shaya**, Command Support Officer, United Arab Emirates Search & Rescue Team (UAE USAR), Heavy Classification from the United Nations - International Search & Rescue Advisory Group (INSARAG) unit



USE THE MESH AND MBK*

TO ENABLE CELLULAR ACCESS

***CELLULAR MODEM**

WHAT IS AN **MBK**

An MBK is a **Mobile Broadband Kit**, an intuitive, simple to use budget conscience 4G/LTE Mobile Broadband Solutions that are tailored to each customers demanding requirements, resulting in a full chain of communications, to provide internet backhaul to your mesh network..

Leveraging the world's cellular carrier's **4G/LTE networks** enables our customers to utilise our MBK™ for hospital and medical operations, pop-up testing locations, field hospitals, clinics, staff work, engineering work, run their businesses, law enforcement, disaster preparedness, first responders, fire departments, emergency management offices and DoD units.

The MBK™ are fielded across two US Army programs of records, the USAF, USN, USMC and federal agencies.

MBK's are FEMA TRM "Approved product listed".

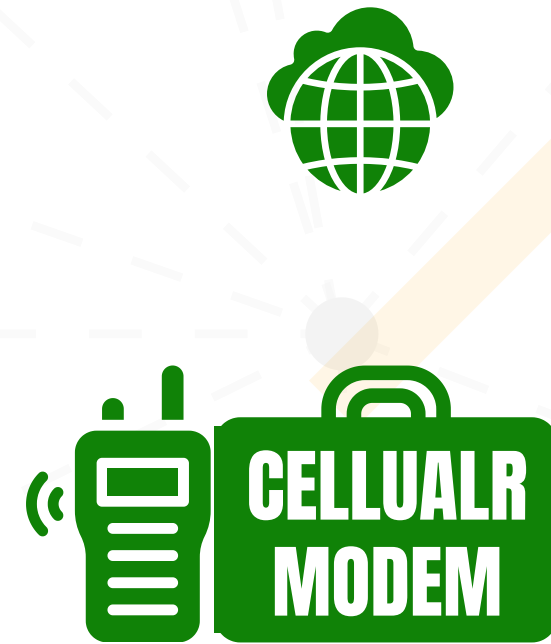
Pictured is the MBK™ 900 Fully Integrated (FI), a 4G/LTE solutions ideal for the customers with a longer battery run time. Contains the CradlePoint IBR-900 with second modem, a ClearRF amplifier, fully integrated antennas and a LifePo4 battery power management system.



MESH & MBK (OR SATCOM) COMMUNICATION CHAIN

CELLULAR NETWORK

The MBK with activated SIM card will give access to the cellular network to all devices connected to a radios WiFi in the active mesh network.



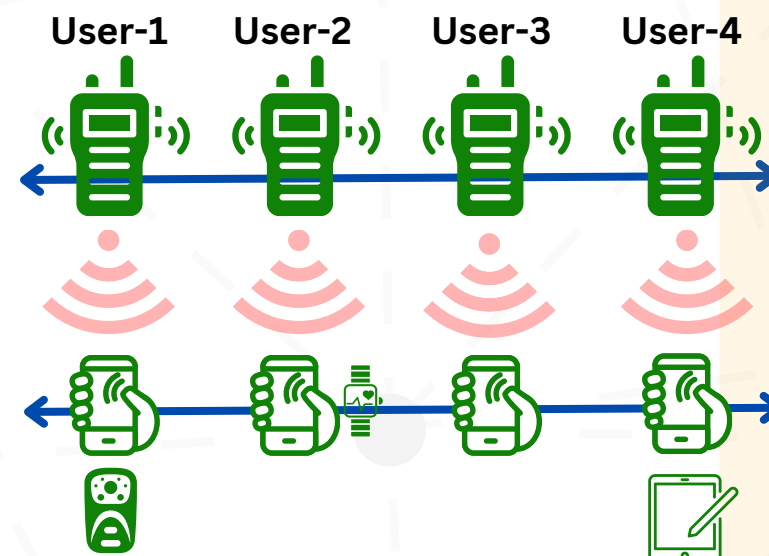
"Commander" Radio*

MBK (OR SATCOM) + RADIO

A radio is connected to the MBK via ethernet cable. This will enable the other radios in the mesh network to give cellular network access to devices such as smartphones, tablets etc.

RADIOS / NODES

All radios that are in range, communicate with each other, including radio attached to MBK. Up to 5 devices can connect to each radios WiFi.



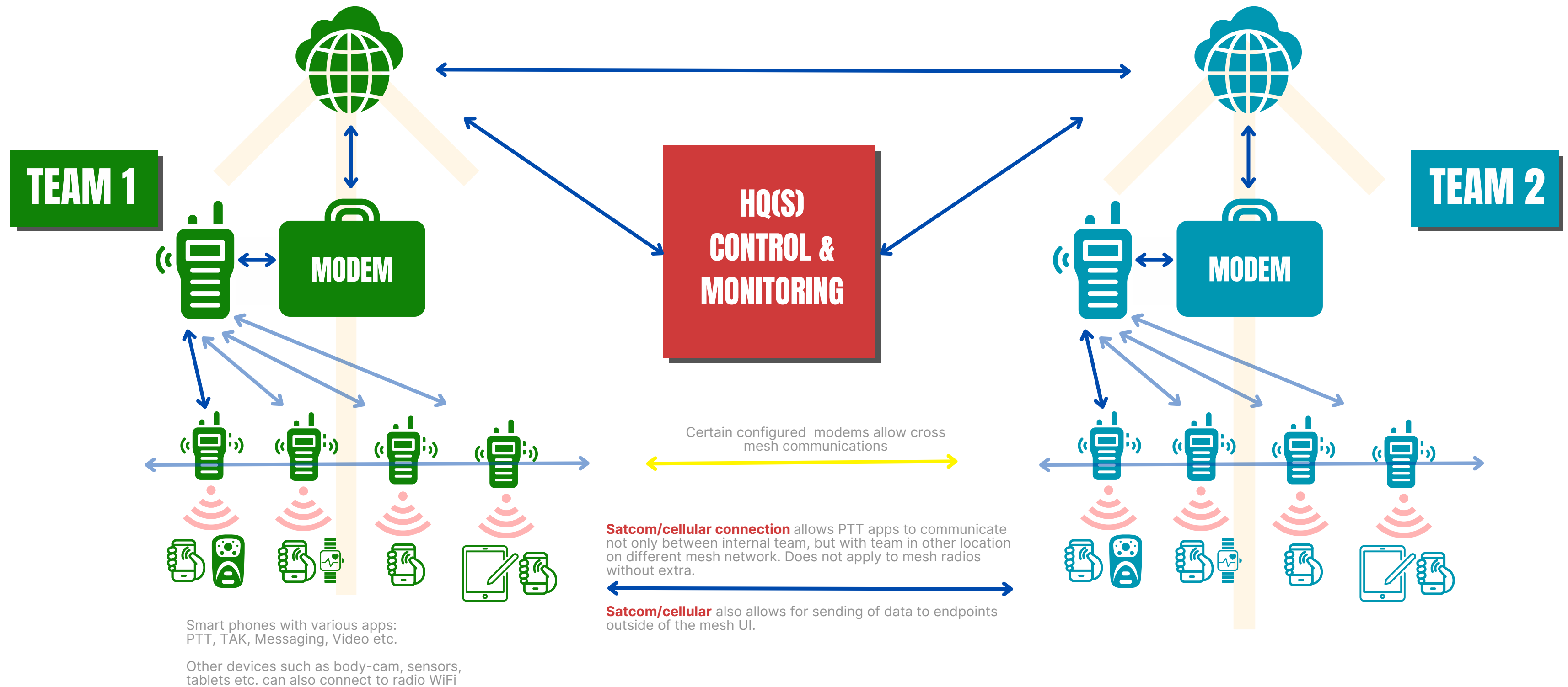
SMARTPHONE / DEVICE NEEDING CELLULAR ACCESS

Once the smartphone is connected to the troops radio (and on to the commander radio and MBK via the mesh) many apps can get access to the cellular network via this communication chain such as:

- Situational Awareness (ATAK, Airbox etc.)
- PTT app (this can enable cross team comms if required)
- RTSP camera app stream (this is a great way to stream video)
- etc.

*Any radio can be the one connected to the MBK
Satcom also available to add to mesh network

MESH & CELL/SATCOM MULTI TEAM COMMUNICATION CHAIN



CONTACT US

FOR MORE INFORMATION

Website: www.sovsys.co

Email: connect@sovsys.co
