

Enhancing situational awareness with TETRA Location Services

TCCA's TETRA Applications Group, led by Hannu Aronsson, Portalify

Real-time situational awareness is important for increasing operational efficiency and helping to ensure the safety of first responders and mobile workers. Knowing everyone's location continuously is a critical part of situational awareness for public safety and business critical users.

Location tracking is often called AVL (Automatic Vehicle Location) or APL (Automatic Person Location). Typically, locations are displayed and updated on a dynamic map within the control room, along with other important data such as activity status and incident information.

TETRA real-time location tracking for enhanced situational awareness

TETRA has the most advanced data features in the land mobile radio (LMR) space, including support for location tracking of TETRA radios with a standardised protocol. This makes location tracking practical on all sizes of TETRA networks, right up to large national public safety networks, with many different user organisations using different equipment.

TETRA location tracking has been designed from the outset specifically for mission critical users.

The direct benefits of accurate, up-to-date location tracking include:

- Quicker response to incidents by being able to dispatch the nearest suitable unit or person
- Worker safety is enhanced by knowing where staff are when an emergency happens
- Ensure that staff are covering every part of the operational area
- Quickly select and view the nearest CCTV camera for visual monitoring

There are also many indirect benefits, including:

- Assess the efficiency of mobile staff and analyse incident response activities for continual improvement of operations
- Archive audit trails to confirm that patrol routes have been completed
- Raise operational performance by being able to work more efficiently
- Reduce risks and insurance premiums with effective lone worker safety

Outdoor location

The most common location tracking solution is to use the Global Positioning System (GPS) and other satellite-based systems. Satellite location works best outdoors. Most TETRA radios available on the market today support satellite-based location tracking.

Many TETRA radios support other navigation satellite constellations (such as Galileo or Beidou) in addition to GPS, providing additional outdoor satellite location capability and serving users in different regions of the world.

Some location applications support reverse geocoding, which converts GPS coordinates into more convenient street addresses

Indoor location

Indoor location tracking solutions enable staff locations to be available when they are working in, for example, airports, tunnels, museums, metro systems or factories.

There are several indoor location solutions available for TETRA radios. These include:

- GPS repeating solutions which enable the TETRA radio to keep receiving satellite location signals when indoors, possibly with less accuracy. This requires installing the GPS repeating solution inside the building.

GPS repeating solutions can also ensure satellite (e.g. GPS) signal lock for vehicles in garages ensuring immediate location updates the moment they leave to attend an incident.

- Device tracking solutions using Bluetooth which can be used to track TETRA radios with Bluetooth support. These systems will require installing active tracking stations in the relevant locations.
- Some TETRA radios support indoor location tracking using industry standard Bluetooth beacons and/or WiFi access points. Existing Bluetooth beacons and WiFi access points can be used in-building or low-cost battery-powered Bluetooth beacons added with 5+ years of battery life, for quick and easy deployment.

Examples of TETRA radios that support indoor location tracking with Bluetooth beacons are Sepura SC20, SC21 and SCG22 series radios and Motorola MXP600, ST7000, MTP3000 and MTP8000Ex Series radios. This is also a great example of how the interoperable but competitive TETRA market can provide advanced features and capabilities to TETRA users based on their specific needs.

- Indoor tracking solutions may be combined with satellite-based systems to enable location of personnel and vehicles wherever they are working.

Location enabled TETRA radio features

Other TETRA radio data features also work with location information, for example the 'man down' alarm or an emergency call can be configured to automatically send the location to the control room when initiated. This means up-to-date location information along with the alarm will be delivered, enabling help to be sent more rapidly.

For vehicle use, TETRA radios allow other devices to read GPS location from the TETRA radio using the TETRA standard PEI (Peripheral Equipment Interface) serial port interface, reducing the number of devices that need to be installed in a vehicle.

If pooled TETRA radios are being used rather than personal issue radios, users can log on to the radio with their employee or police ID number when starting work. The location tracking can then track the user and not just the radio and show the current user's name on the map: tracking people, not only radios.

Location-based actions

Geofencing is a powerful tool to manage TETRA radio features based on the users' location. Geofencing can be done in the control room or even on the TETRA radio itself depending on the model.

Examples of geofence functionality include

- Changing talk group when the user enters or leaves a location
- Showing a reminder message if the user enters a hard-hat area
- Reminding users to select the incident specific talkgroup when leaving their home region to support larger incidents
- Open gates when authorised vehicles or users approach the location
- Alert if buses leave their planned route

TETRA location tracking supports multiple verticals

Here are some examples how TETRA location capability can serve many different verticals:

- Public safety
 - Provide quicker response by choosing the nearest suitable resource
 - Location information always available over the secure mission critical network, even during incidents or natural disasters
 - Know where all officers are, to prepare better and provide higher job safety
- Transport
 - TETRA can track every bus, tram and ferry location for up to date travel information
 - Identify traffic delay issues based on comprehensive location information
 - Provide real-time traffic information to station and bus-stop displays
- Utilities
 - Quicker response to incidents based on unit location
 - Follow in the control room how soon a unit will arrive on location
 - Provide higher job safety with location-enabled man down and emergency call features on radios
- Energy
 - Lone worker protection on power stations, oil refineries and wind farms
- Mining
 - Ensure people are in the correct talk group when they move around the site
 - Enforce vehicle speed limits with geofences for safety
- Industrial
 - Alarm people based on their location in case of emergency evacuation

- Provide quicker response in emergency based on up-to-date location information
- Tracking location and status of autonomous mobile machinery

Technical deep dive: TETRA's standard LIP location protocol

TETRA has been designed specifically for mission critical operational use, including location tracking support.

LIP (Location Information Protocol) is a TETRA standard protocol between radios and control rooms for location tracking. LIP has been designed to provide best quality location data on a narrowband radio network for public safety operational needs.

The standardised LIP allows radios from any TETRA vendor to be tracked from a control room. This enables centrally managed location services for large TETRA networks with multiple organisations who may use different TETRA radios.

LIP allows the control room to control remotely when the radio will report location, based on parameters such as unit status or task priority. LIP supports both time and distance travelled based triggers for location updates, which allows both moving and stationary units to be tracked efficiently.

LIP provides more data than just latitude and longitude. LIP location reports include speed and direction and the reason why the location was sent, e.g. distance trigger, emergency call, or I/O connection state change on a vehicle radio from an external integration.

LIP also supports out-of-coverage location history buffering which means that the TETRA radio can collect location data while out of network coverage, and the radio will send the location trail data to the control room when it comes back into coverage.

The LIP protocol is designed to be efficient over a narrowband TETRA network, using small data packets to enable many radios to send their location over the network. This allows tracking large numbers of radios or vehicles, for example in public transport where location data can be used to provide up-to-date information to the public in addition to the control room.

TETRA Location Summary

TETRA enables mission-critical indoor and outdoor location tracking of staff and assets to increase effectiveness, efficiency and safety of mobile operations. Standardised location tracking means maximum use of users' investment in TETRA.

END OF ARTICLE

Possible screenshots/graphics if needed

Location view showing indoor location on a building plan map (portalify.com)



Location view showing outdoor locations on a map (portalify.com)



