

SOLUTION BRIEF

Rolling Out Next-Generation Public Safety Networks

Simplifying deployments with innovative RF planning solutions



Critical communications: The need for public safety networks

The land mobile radio (LMR) systems used by police forces, fire departments and emergency responders are often out of the public eye until an event stresses them to the point of failure. In this way, the events of September 11, 2001 and the inability of various agencies in New York City to communicate in a coordinated manner, was a critical driver for a new way of thinking about public safety networks in the United States and the genesis of FirstNet.

The challenge of interoperability

There are two predominant land mobile radio (LMR) systems in use around the world today, Project 25 (more commonly known as P. 25) in North & South America and China, with European Terrestrial Trunked Radio (TETRA), standardized by the European Telecommunication and Standardization Institute (ETSI), used in Europe and the Middle East.

Historically, efforts have been made to develop interoperability between these predominantly voice-based systems. However, with all-IP 4G networks deployed around the world, and large operators such as FirstNet and the UK’s Emergency Services Network driving requirements, the world will soon have the first broadband public safety networks based on LTE. The RF Planning challenges for these networks are similar to those of traditional LTE mobile carriers, with a series of additional requirements unique to this industry.

The co-existence of P.25 and TETRA networks for the foreseeable future provides one such unique consideration, as does the need for having push-to-talk service and broadcast “one-to-many” capabilities.

Unlike the clean hierarchies of mobile carriers, public safety networks have a variety of stakeholders – each with varying and potentially “geo-specific” interest in access to network information. These challenges require an evolved RF planning software that is capable of integrating with existing systems and processes, while delivering excellent LTE modeling capabilities.

Planet by Infovista provides a proven and futureproof solution to the public safety community to simplify their migration to advanced LTE standards-based networks.

FIRST MOVERS TO LTE-BASED PUBLIC SAFETY NETWORKS

In 2012, the US Congress created the First Responder Network Authority (FirstNet) with the mission “to build, operate and maintain the first high-speed, nationwide wireless broadband network dedicated to public safety.”

Provided with nationwide 20 MHz of Band 14 700 MHz spectrum, this network is meant to remove the intra-jurisdictional issues from a patchwork of existing public safety networks. In January 2016, FirstNet issued a request for proposal for the country’s first public safety network based on LTE. One month earlier, the UK government signed a contract for the creation of the LTE-standards based “Emergency Services Network” to replace the existing TETRA public safety network in the United Kingdom by 2020.

KEY RF PLANNING CHALLENGES FOR PUBLIC SAFETY NETWORKS

- Interoperability concerns of overlapping P.25/ TETRA and LTE networks
- LTE-based systems offer many advantages but transitioning to them will take time and considerable effort
- Multiple stakeholders have varying levels of involvement – some need full planning capabilities, others access to network coverage (i.e., Federal), others supervisory (i.e., local) and administrative access (i.e., state/region)
- Urban environment offers tremendous RF complexity not fully considered by existing networks
- Market has been much smaller than mobile carrier ecosystem and has received less attention from the larger vendor community as a result.

HOW LTE NETWORKS FIT WITH EXISTING P.25 AND TETRA

- Existing critical communications networks used by emergency responders have the benefit of being deployed with their users having local knowledge of potential holes in coverage.
- As these systems still work, the most probable scenario is LTE systems being initially deployed in urban areas to benefit the most from their advanced technology.
- From a planning perspective, understanding the coverage of the existing P.25 or TETRA system versus the proposed LTE replacement will be critical.

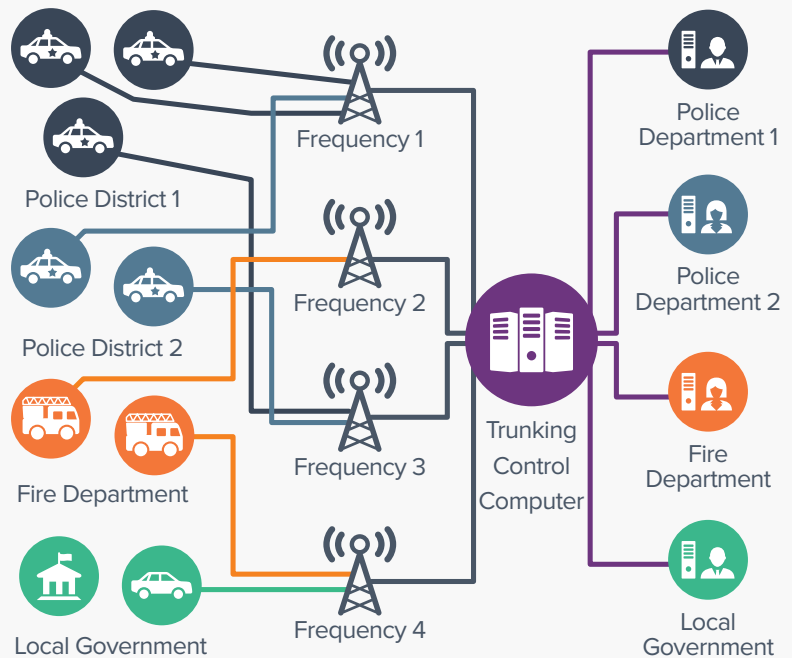


Figure 1. Existing P.25 and TETRA networks are often deployed for each branch of first responders with limited ability to talk between systems. LTE-based critical communications systems aim to change this paradigm.

3GPP AND PUBLIC SAFETY

After FirstNet selected LTE as its network technology in 2009, the 3GPP began working with ETSI, TETRA, the Critical Communications Association (TCCA) and the US National Institute of Standards and Technology (NIST) to better understand the needs of the public safety community. Initial efforts in 3GPP Release 12 involved proximity services – whereby two mobiles near to one another are able to have direct communications – and the ability to have broadcast (i.e., dispatch one-to-many) services supported. Mission-critical-push-to-talk standard (MCPTT), deemed essential to the first responder community, was added to the 3GPP standard in Release 13 finalized in 2016. This functionality will make its way into FirstNet and UK’s Emergency Services Network.

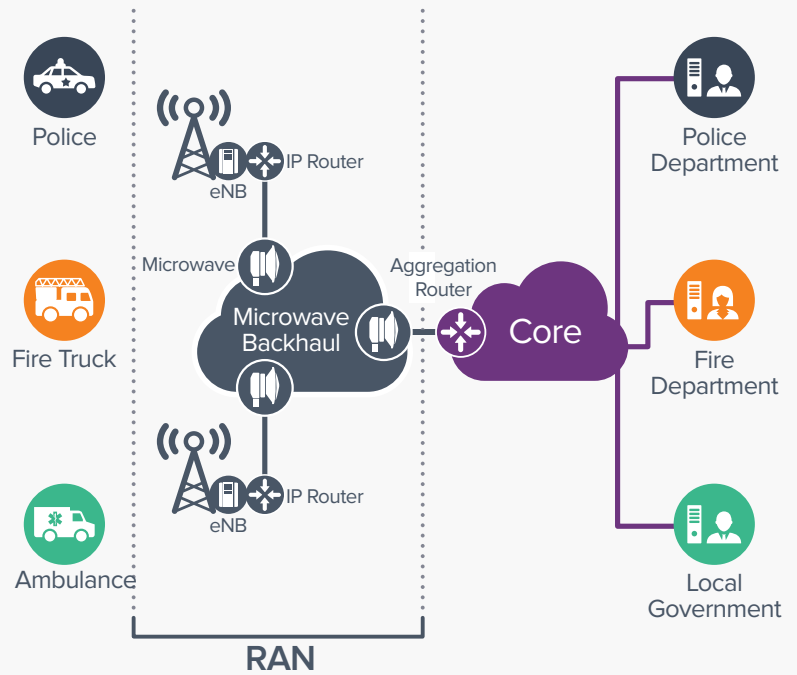
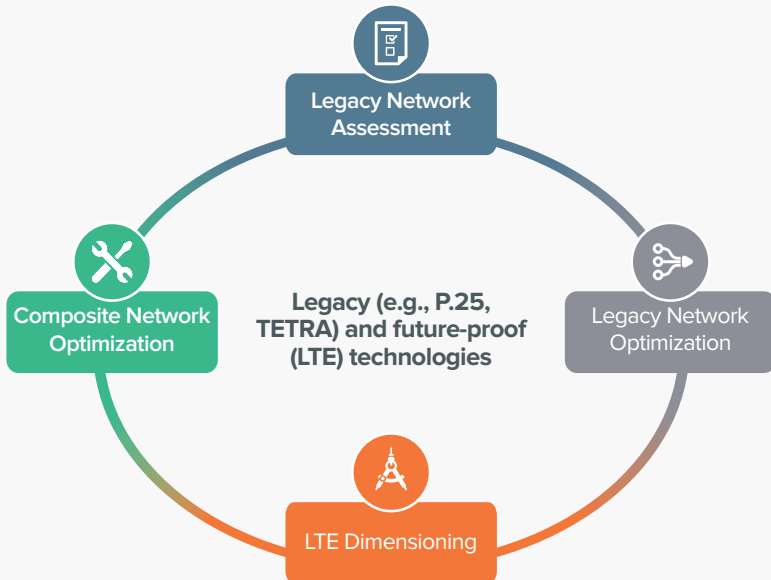


Figure 2. LTE public safety networks promise increased functionality (i.e. support for data and video) and simultaneous use by multiple agencies through shared infrastructure.



ASSESSMENT SCORECARD FOR RF PLANNING SOLUTION FOR PUBLIC SAFETY NETWORKS

- Propagation modeling accuracy
- Highly accurate geodata with flexible use options
- Enterprise-grade with data management and ability to integrate with other systems
- Dimensioning and related rollout planning support
- Multi-platform availability - standalone, enterprise and private/public cloud
- Ability to incorporate geolocation information
- Support in operator’s time zone

Figure 3. Planet delivers a futureproof platform that supports legacy public safety and LTE network planning capabilities throughout the network lifecycle.

Figure 4. Planet is available in various deployment options to suit customer requirements.



RF PLANNING SOFTWARE FOR PUBLIC SAFETY NETWORKS

As a smaller ecosystem that utilized technologies such as P.25 and TETRA, public safety did not traditionally receive as much attention from the broader mobile ecosystem – including RF planning software vendors.

Now that LTE for public safety is being utilized, leading planning software from Infovista can be easily extended to the critical communications community. While technology-specific features are now available, the real benefit to operators and other stakeholders is the platform capabilities of software with roots in the first deployments of 2G networks and support today for pre-standards 5G functionality.

TEMS™ AND PLANET – NOW TOGETHER

In the fall of 2016, Infovista acquired the TEMS business from Ascom. This acquisition included TEMS Investigation, the industry standard for troubleshooting, verification, optimization, and maintenance of wireless networks.

TEMS Investigation is the ideal testing tool for every stage of a network’s life cycle. It has been the leading originator of drive-testing features and functions for two decades, and is a complete, cost-effective and compact solution for the active field engineer. Infovista’s R&D is working to leverage the powerful end user perspective that TEMS Investigation provides into Planet for the Public Safety Community.

FLEXIBLE DEPLOYMENT OPTIONS

Planet delivers users with many deployment options. From traditional desktop end users, to client -server and more innovative private and public cloud options. SAAS models allow for convenient billing and easy access to interested stake holders through any web connected device.

ACCURATE PROPAGATION MODELING

At its core, an RF planning software solution is designed to model the area of interest using prediction models that accurately reproduce the propagation phenomena expected in the real world. Planet offers a range of proprietary and industry standard propagation models.

The internally developed Planet 3D model is ideally suited for use in public safety networks – including dense urban environments – and is fully tunable.

This model, when used with appropriate building polygon geodata, lets a user assess indoor coverage from the network at multiple potential receiver heights.

MAPINFO/GIS

Planet is the only RF planning software with an integrated geographic information system. As RF coverage is a spatial problem, the ability to run in-depth MapInfo Professional™ analyses has always been a great strength of the platform. Population coverage and related statistics, the ability to view multiple synchronized windows with coverage predictions (i.e. for legacy and planned networks) and run analyses on any computed layer of information is all possible.

OPEN FOR INTEGRATION WITH OTHER SYSTEMS

The software offers multiple options to integrate third-party systems or applications using comprehensive and documented Application Programming Interfaces (APIs). As enterprise-grade software, Planet can be integrated into much larger systems to provide coverage updates, configuration management and network utilization (based on integrated call trace information). These capabilities – and many more – can make Planet an integral part of a dispersed planning group with stakeholders remote to the day-to-day planning operations.



PLANET PUBLIC SAFETY USE CASES

- Legacy network assessment (e.g., capacity issues and coverage holes)
- LTE business case analysis
- Network migration strategies
- Confirming design eligibility for funding requirements

P.25 AND TETRA CAPABILITIES

Planet includes the optional P.25 module, a product designed for narrowband public safety network planning. Features include coverage planning, simulcast coverage grids and more. FCC rules and contours will be included, along with Receiver-only and Over the air Rekeying (OTAR) site planning. The module will also benefit from Planet’s extensive R&D in indoor/outdoor planning, and from unique capabilities to integrate with TEMS measurement devices.

GEODATA

Geodata is a critical input to a complete RF Planning solution for public safety. With an inhouse team dedicated to this task, Infovista is able to provide a complete software and data planning solution. This team can advise on the best utilization of budget and potential accuracy tradeoffs for different types and resolutions of geodata.

Figure 5. A P25 network with a proposed LTE public safety network overlay



BENEFITS

Through its work with FirstNet and its stakeholders, Infovista has established itself as a global leader in the public safety ecosystem. Of course, a true leader doesn’t rest on its success so the market can catch up. Infovista will be integrating TEMS capabilities into its Planet solution as part of its acquisition of this business. The company continues to work with leaders in the industry and is looking at innovative approaches for indoor location. Planet is also the first RF planning software available as a cloud-based solution.

INFOVISTA’S PUBLIC SAFETY MILESTONES

- Planet selected by APCO as Public Safety Communications Hot Product for its role in FirstNet Initiative – 2014
- National Institute of Standards & Technology (NIST) selects Planet for public safety propagation study
- State of New Jersey and Colorado select Planet for designing their first responder network

INTEGRATED GEOLOCATION — INCLUDING INDOORS

Planet supports the ability to visualize — and use as inputs for demand/traffic planning — network call trace information. Call trace data is obtained from the connection between the mobile devices and the network, typically obtained at NodeBs in LTE systems. Call events and the associated Layer 3 messages used to control the mobile connectivity provides signaling information, mobile measurement data as well as user & phone identification.

Planet combines the power of its propagation engine, incorporating the geodata such as terrain, clutter and building footprints with its optional geolocation engine that provides call trace information for best server

cell ID, timing advance/ propagation delay as well as received signal strength.

This combined view provides the public safety community with the most realistic view of its operating network, including indoors.

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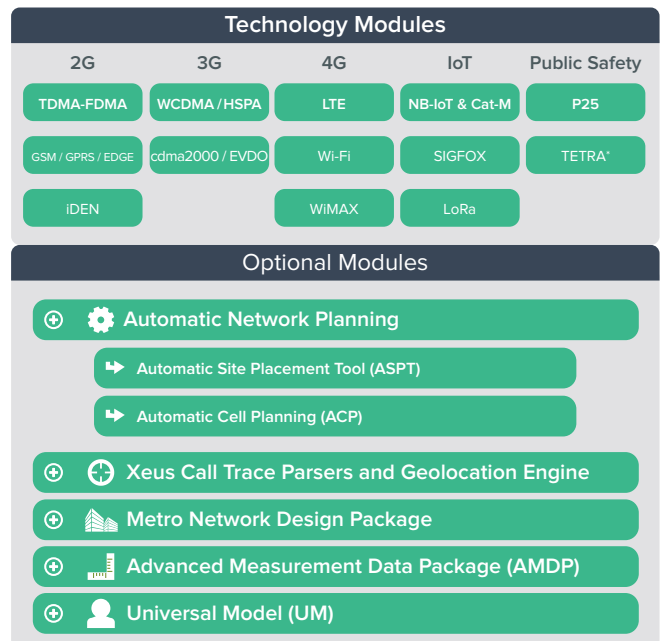
PLANET FOR PUBLIC SAFETY – SIMPLIFY THE MIGRATION TO LTE

Public safety network planning is undergoing a renewal of interest by the larger mobile ecosystem as the community moves towards LTE-based systems and large projects are undertaken.

The challenges faced by the multi-stakeholder nature of these deployments and the need for mission critical communications by first responders makes these networks particularly challenging.

Planet from Infovista, the original RF planning software for mobile networks, brings a robust platform with diverse deployment models to the public safety community. With strong ties to FirstNet through the years, Planet is evolving its product to attract P.25 and TETRA customers looking to migrate to LTE. A turnkey Planet RF planning solution, including software, geodata and related support is ideally suited to simplify the public safety community’s migration to LTE-based systems.

Planet for Public Safety



EXPERT CUSTOMER SUPPORT 24X7

The Planet team is available around-the-clock through its support teams that cover the world.

Public safety network operators and the vendors they employ can get support in their time zone and language. Infovista’s customer care group can support questions tied to Planet software and related geodata, as well as the technology being deployed.

FUTUREPROOF PLATFORM

Public safety network operators will benefit from the ongoing development of the Planet platform. All benefits will be passed along or made available to operators on software maintenance. Continuing efforts and improvements in propagation tied to 5G technologies, potentially integrated into the 3GPP’s Public Safety roadmap one day, are already available in Planet.

IN SUMMARY

The RF planning challenges for LTE public safety networks are similar to those of traditional mobile carriers, with a series of additional requirements unique to this industry. The co-existence of P.25 and TETRA networks for the foreseeable future provides one such unique consideration, as does the need for having push-to-talk service and broadcast “one-to-many” capabilities.

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About Infovista

Infovista, the leader in modern network performance, provides complete visibility and unprecedented control to deliver brilliant experiences and maximum value with your network and applications. At the core of our approach are data and analytics, to give you real-time insights and make critical business decisions. Infovista offers a comprehensive line of solutions from radio network to enterprise to device throughout the lifecycle of your network. No other provider has this completeness of vision. Network operators worldwide depend on Infovista to deliver on the potential of their networks and applications to exceed user expectations every day. Know your network with Infovista.