



# Voices of a nation

**Philip Mason** gives an update on the US TETRA market, finding contrasting opinions about the anticipated use of the technology going into the future

**W**hen it comes to the international TETRA market, there are very few territories which have proven as potentially complex as the United States.

In terms of the public safety side of things, for instance, companies have been unable to get a foothold due to the federal government's historical preference for parallel technology P25, at least when it comes to narrowband. Those wishing to sell into other 'mission critical' verticals have found the road only slightly easier, meanwhile, dealing with a variety of other factors, such as those around the use of spectrum.

From the TETRA industry's perspective, all this has possibly represented somewhat of an unfulfilled opportunity. This feeling has likely been compounded by the sheer size, and therefore potential value, of the market in question.

There are hundreds of 'mission critical' organisations operating across the States after all, all of which need to communicate with each other via the use of some kind of radio.

With that in mind, in this article we are going to bring readers up to date with the state of the market as it stands today, several years after our last specific focus on TETRA in the US. A

lot has happened since the standard's first commercial roll-out in 2013, not least a slow but steady uptake of the technology across different verticals.

At the same time – crucially – we are also going to be looking at the potential impact of broadband on LMR as a whole, with the former already elbowing its way into the conversation via FirstNet, Verizon Frontline and so on. Public safety isn't the only sector dallying with 4G, however, with utilities companies, mining and more now seriously looking at the potential benefits of increased bandwidth.

## Difficulties of the market

PowerTrunk is one of the key players in the US TETRA market, having been responsible for numerous roll-outs across a variety of different verticals (including the 2013 New Jersey Transit system obliquely referred to above). The company's president and CEO is Jose Martin.

Speaking of its original entrance into the US market – and why the company decided to invest in the territory in the first place – he says: "The United States has traditionally been an incredibly difficult environment for TETRA. This is a huge country, and even today there are people who know little – or even nothing – about the standard.

"There's more knowledge on the east

*New Jersey and New York were among the first locations for commercial TETRA in the US*

coast, mainly because of the customers that we've built up. But in somewhere like the Midwest, for example, people have never heard of it – or relate at all to what organisations are doing in Europe or the rest of the world."

He continues: "In terms of why we wanted to get involved, we simply saw the United States as greenfield. We did it because it was the last frontier for TETRA and, ultimately, we always need to find new markets.

"Our very first North American customer was BC Hydro, which is a utilities company based in British Columbia, in Canada. They put out an RFP open to all different kinds of digital radio technologies, and we won. As it turned out, at the time, Canada and the US had very similar standardisation rules. They amended theirs very quickly because of BC Hydro's decision, but the Americans are tough."

Without wanting to get too bogged down in the political aspects of this topic, Martin outlines several factors which he believes have historically limited the implementation of TETRA across the US.

The first of these is the Federal Communications Commission (FCC)'s method of what he refers to as equipment authorisation. According to him, this was – and in some frequency

bands still is – based on “emission masks and occupied bandwidth limits”, rather than “modern adjacent channel protection (ACP) criteria, as is common in the rest of the world”. In his words: “TETRA’s non-compliance with emission masks gave rise to the misconception that it would cause interference.”

Another factor, meanwhile, is the expectation that all narrowband radios operating on public safety bands – for instance, 700MHz – must be compatible with the government-preferred P25 standard. As mentioned, this has, rightly or wrongly, all but negated TETRA for use by US first-responders.

Coming back to the present day, PowerTrunk has at this point participated in around 25 TETRA projects, involving a variety of different verticals across both Canada and the US. These have included San Francisco and John F. Kennedy airports, utilities operator Diverse Power in Georgia, as well as the Flint Hills Resources Pine Bend Refinery in Minnesota.

Arguably the most famous work undertaken by the company, however, is the dual roll-out carried out on behalf of two east coast public transport providers, New Jersey Transit (NJT) and New York City Transit (NYCT). These not only illustrate how effective – not to say versatile – TETRA is as a technology, but also the level of ingenuity which has traditionally been required in order to actually get it deployed in the United States.

Discussing these headline projects, Martin says: “Everything started in New Jersey with the transit agency, where we were subcontracted by Alcatel-Lucent USA, in co-operation with whom we had won the contract. They were looking for something which could support advanced data applications, as well as, obviously, exceptional quality when it came to voice.

“Because of the aforementioned equipment authorisation issues, we developed what might be regarded as ‘pseudo’ TETRA, which worked well. That required modification of equipment on our part as well, until the FCC – after the award – ultimately amended its certification rules to accept the TETRA spectrum, without modifications, in the 800MHz and 450-470MHz bands.”

He continues: “NYCT became interested in 2014, having seen the

## “ If you combine New York and New Jersey, we supply to the largest public transport authority in the world ”

work which had been carried out with their neighbour across the river. Again, that required a certain amount of ingenuity on our part, in order to make use of the 700MHz and 800MHz spectrum which they had available.

“After we won the contract, we were able to comply with FCC rules by developing multi-mode devices, where the user has the ability to select either TETRA or P25. The P25 aspect is fairly rudimentary, representing Phase 1 functionality, alongside group calls, as mandated by the Department of Homeland Security, through the P25 Advisory Panel.

“If you combine the New York and New Jersey contracts, you could argue that we provided critical communications technology to what is essentially the largest public transit organisation in the world. Both agencies co-operate together and are interacting all the time.”

We shall return to the east coast – and in particular the so-called Garden State of New Jersey – later in the article.

### The shock of the new

Speaking to Jose Martin, you sense a palpable optimism when it comes to the future of the standard as deployed in the United States. Progress may be comparatively slow, he suggests, but the technology is gradually proving its worth, deployment by deployment.

Someone with what could be described as a more tentative outlook, however, is Omdia senior principal analyst for public safety and critical communications Ken Rehbehn. For him, TETRA will likely continue to face an uphill battle in the States, primarily due to the unfamiliar nature of the technology on the part of the majority of users.

“There are reasons to be optimistic when it comes to TETRA, certainly,” he says. “The companies involved have already made the investment, meaning that every additional customer gain is relatively inexpensive to get. At this point, it’s primarily a matter of educating people.

“We also know TETRA’s various benefits as a technology, something which stands it in incredibly good stead. It’s a robust, incredibly secure, effective media for group communications, coupled with a highly scaled ecosystem. In terms of the market, I would say transit is a particularly good target for TETRA, and the story is very solid there.

“At the same time, it’s quite a complex technology, for instance when it comes to supporting the security aspects. That being the case, it might be a challenge to convince American utilities to veer away en masse from solutions which they already know and trust, whether that’s DMR or even analogue.” ▶

*Utilities companies are investigating the use of broadband*





Adobe Stock/Bumble Dee

Staying on the subject of utilities in particular, Rehbehn believes that the situation will likely be further complicated by energy companies' apparent willingness to look at private broadband networks. This could be further compounded by a recent development, again taking place in the realm of spectrum.

Elaborating on this, he says: "Another factor in all this is the imminent reorganisation of the 900MHz frequency, something which is heavily used in the US utilities sector.

"Following a process of lobbying by a private LTE network operator called Anterix, the FCC has agreed to aggregate a block of SMR spectrum in that band, specifically to support LTE. Anterix's strategy – perfectly reasonably – is to engage with the utilities sector, in order to instigate migration to a primarily LTE-based approach."

Looking beyond the subject of just TETRA for the moment, what effect does Rehbehn believe the change outlined above will actually have on the broader market? If utilities companies really are slow to move away from tried-and-tested technology, why should the situation be any different when it comes to the adoption of broadband?

"It will certainly be a long process," he continues. "However, it's one that's been in play for several years. LTE is now a mature, much-better-understood technology than it was, certainly compared with 5G.

"At the same time, the story within the utilities sector in particular is compelling. They have the opportunity to update their systems, moving towards a technology which handles data very effectively, while also offering the benefits of group voice communications."

### Greetings from Asbury Park

There are clearly different points of view regarding the future of TETRA, and indeed critical communications as a whole, when it comes to the US market. Rehbehn, for instance, believes that broadband will likely impose an increasingly strong presence, whereas Martin remains less convinced.

That being the case, perhaps the last word should go to someone with a direct experience of using the technology itself. And who better than New Jersey Transit, which commissioned the US's first commercial TETRA network almost 10 years ago.

Discussing why the organisation

### US public safety represents a huge market

chose TETRA, its director of radio communications, Andy Schwartz, says: "Back in 2013, the idea was to keep the system as technology-neutral as possible, letting the requirements of the business dictate what we chose. One solution does not necessarily fit all circumstances, and we wanted something very specific."

He continues: "In terms of the roll-out itself, we targeted the system for use across the enterprise, including light rail, all of our buses – of which there are around 2,300 – as well as contracted independent bus companies, and our non-revenue operations personnel. We wanted the provision of both voice and data on a single network, with the latter being used primarily for location services.

"We need to automatically update the location of every bus approximately once every 30 seconds, which in turn feeds into electronic signage, maintenance alerts and so on. Nothing huge from a data perspective, but crucially important to the successful operation of our transport system."

According to Schwartz, the network is now fully deployed, with over 4,000 subscribers. The final phase of the project – expected to be fully rolled

**“ I look at broadband primarily as a complementary technology to what we already have ”**

out towards the middle of this year – is the TETRA integration of advanced features for the company’s existing computer-aided dispatch system.

Deployment has not necessarily always been easy, however. This was the first commercial TETRA system in the US, after all, and the organisation essentially had to learn as it went along. One core difficulty in relation to this has been coverage planning, specifically taking into account the sheer variety of terrain existing across the state of New Jersey (the network operates within 800MHz).

“It’s been the project that never seems to end,” says Schwartz. “By December 2013, we’d put up enough of the new network to cover the services operated by our partner bus companies, as well as light rail trollies, maintenance vehicles and so on. Phase 2, which involved getting our own buses on the system, is now also complete, after addressing additional coverage needs.

“One of the most complicated things in relation to the project has been providing coverage. Most people’s

view of New Jersey is informed entirely by what they see when they arrive at Newark Airport – very industrial, in other words – but the topology is much more varied than that.”

Schwartz illustrates this by mentioning his own home in Sussex County, located northwest of the more urbanised Essex County and the city of Newark. At the same time, there is also the likes of Asbury Park (“where Springsteen comes from”), located around 40 kilometres to the south of New York City, across an expanse of water known as New York/New Jersey Bight.

He continues: “The place where I live is heavily forested, with lots of hills and lakes. They call Sussex ‘The Skylands’, and we occasionally have black bears roaming around here. At the same time, somewhere like Asbury Park is situated on the coastal plane, where it’s very flat and sandy. The ‘Jersey Shore’ in other words.

“We also have dense urban areas, such as Newark and Jersey City, and the design approach needs to be different

with each type of area. The system has ultimately been designed to provide capacity and coverage where it’s most needed, almost like a commercial cellular network.”

Alongside coverage, meanwhile, another challenge has been the integration of New Jersey Transit’s aforementioned legacy computer-aided dispatch (CAD) solution with its new state-wide TETRA radio system.

According to Schwartz, this has been accomplished across all 2,300 buses. The organisation’s parameters, however, require “mission-critical redundancy”, meaning that the CAD’s data path must be able to utilise both cellular modems and/or TETRA. This requirement – according to Schwartz – is fairly complex to implement, and should be completed soon.

This complexity, he assures me, has to do with externally managing the mechanics of using two data paths, rather than anything to do with TETRA technology.

Coming back to the subject of the US TETRA market as a whole, he says: “My expectation is that we’re going to continue to see growth, with take-up of the technology slowly picking up speed. We were the first to roll out in the United States, and we’re now getting other transport companies coming to us to ask for the benefit of our experience.

“The entrance of TETRA into the American market took an incredibly long time, and as such many companies went down a different path. But people really are now starting to see the value in it, especially in the utilities and transport sectors, with a lot of the big airports choosing the technology. I don’t think it’s going to take off like wildfire, but you’re going to see slow and steady growth.”

Addressing the broadband question, he continues: “I look at broadband primarily as a complement to what we already have. There’s clearly a place for it, and of course we use cell phones ourselves. But the idea of replacing a mission-critical private network with a broadband provider? It could happen one day, but at the moment, it’s not even on the table.”

When it comes to critical communications, the United States continues to be one of the most-talked-about markets across the world. With so many predictions about its future direction, it will be fascinating to see where things go from here. ☺

*New Jersey consists of many different terrains including the beachfront at Asbury Park*

