Safety first for LTE

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With the LTE North America conference less than two weeks away, we catch up with Emil Olbrich, lead project engineer at the National Institute of Standards and Technology on the work that is being done to create a Public Safety network based on LTE.

Emil Olbrich, lead project engineer, NIST is working on testing LTE solutions for Public Safety

With its promise of faster connectivity LTE is widely acknowledged as a technology that is gradually transforming people lives throughout the world. However, it has the potential to do so not just for consumers. In the US, there's currently a lot of momentum building around the possibility of using LTE to create a public safety network for use by first responder groups such as the police, fire departments and ambulance services.

NIST is the US federal government technology agency that works to develop and apply technology measurements and standards, and according to lead project engineer Emil Olbrich, creating a public safety network based on LTE will offer a number of benefits.

"We live in a world where data is crucial," he says. "There are devices that can provide a lot of data that could be very useful, such a providing details on the emergency, such as detailed schematics of a building." Fast LTE connectivity for first responder service could enable them to efficiently use dispatch applications and help with the downloading of large files, providing greater situational awareness. In-car video could also aid communications and evidence gathering.

For the network vendors and the device manufacturers, creating a public safety network isn't for altruistic reasons – it's a great opportunity for them to expand their market. "All the vendors are interested in this marketing opportunity, along with the device manufacturers and are participating in our projects, "Olbrich reveals. "They have a vested interest in public safety and we have a vested interest to support it, so it's a mutually beneficial relationship. And we're able to evaluate the equipment and that goes on, on a daily basis."

Olbrich is referring to the fact that all equipment that is touted for Public Safety use has to come under the stringent gaze of NIST and pass a barrage of stringent tests, such as

the industry standard PTCRB (PCS Type Certification Review Board).

While the technology might be shared with those of the regular carriers the Public Safety network is completely separate from that of the mainstream LTE carriers. This is to ensure that in times of emergency, when everyone is trying to communicate simultaneously, it will not be affected by any congestion issues. Obrich explains; "Commercial services may work nominally, but in terms of an emergency when you really need it, when you have life and property at stake, then you want to have a dedicated system. The quote that we hear from Public Safety here in the US is that, "it needs to work first time, every time."

But would it not make sense then to create a custom proprietary solution? In fact, using LTE for Public Safety makes sense for a number of reasons. A primary reason is, inevitably, due to cost. LTE's success on a global scale means that it enjoys an ever increasing eco-system, and this will help to bring down costs of infrastructure and devices. It's also increases the potential for increasing the development of new features that could really enhance the service. "We have a global backing now of vendors looking to develop features and content applications that otherwise wouldn't be available in a closed market," Olbrich says.

And as LTE is only at the start of its journey as a standard, it also provides the Public Safety block with the potential for adding new features and improvements. Olbrich explains further "We wanted a future growth path, and LTE is just beginning right now. From the standards path LTE looks to have a very long future ahead with regards to standards compatibility with regard to Public Safety."

It it's not just one way traffic. If LTE is established as the technology basis for Public Safety in the US, that could be fed back into creating a worldwide Public Safety standard. The fact that the US is primarily based around 700MHz for LTE will have little impact on this. "The nice thing about LTE is that whatever band the feature set that we're working on is, it's not unique to it. We want to create a 3GPP global standard."

However, it's not just a case of building a network and turning it on. There are major challenges facing the network creation that will have to be overcome. These are both political and technical and the two are very much intertwined.

The US Public Safety network has been allocated the Public Safety Broadband block – half of the Band 14 700MHz block. While Band 14 is a 10Mhz by 10MHz allocation, as Public Safety has just half it can only operate at 5MHz x 5MHz.

There is however, a large effort afoot by Public Safety to get the other half of the 5MHz by 5MHz block, known as the D Block. This will enable it to have a 10MHz by 10MHz allocation similar to Verizon and AT&T, providing them with the spectrum for future growth as its needs grow; specifically the capacity to support the high bandwidth applications of the future

However, the status of that spectrum is in the hands of congress, and as it stands, it is not clear whether it be given to Public Safety or auctioned off commercially. The result are unlikely to be known before the first quarter of 2012 at the earliest.

For NIST this means that while at present all its tests are limited to 5MHz, if the D Block gets allocated to Public Safety, essentially it will have to start again, and redo all its testing for 10MHz. "It will really double our efforts," says Olbrich. "It also changes the configuration of the base stations and filter design in handsets to ensure that there is proper interference mitigation and things of that nature."

Looking to the future Olbrich says that LTE gives a lot of scope for technical enhancements. As part of that need for resilience and robustness, NIST is working to enhance the security capabilities of 'standard' LTE, as Public Safety system could theoretically come under attack from terrorists. As it stands LTE employs 128-bit AES encryption but Olbrich says NIST could take that up to 512-bit.

Olbrich is also excited by the possibilities of Release 10 of the 3GPP standard, also known as LTE Advanced, which will bring Self Organised Networks to the fore. "The ability to have SON will be a unique opportunity going forward. For example if you have a football game or a large scale events with hundreds or thousands of people located within a specific geographic area we can then tune the system to support public safety responders in that area to support the first responders appropriately and then retune the network once that event is done without having to physically send people out. It can be a very specific and cost effective way to improve performance."

Ultimately, the goal of NIST, Olbrich says, is to create interoperability standards on the

infrastructure side. “That is the intent of having an open standards in LTE. Most of the networks now are closed as it’s a single vendor implementation. We want to be able to tie into multiple vendors and show true interoperability. The vendors will have to work on it, but we would have to implement it in our labs.”

This combined vision is one that will further the cause of LTE worldwide, expanding the eco-system and driving costs down. If it can be made to happen, it will accelerate the development and deployment of LTE based Public Safety that will create great opportunities for the infrastructure and device manufactures, while enabling first responders to do their jobs more efficiently and effectively than ever before.