Mission Critical Data Applications

Does TETRA offer the best solution for mission critical data applications? This case study by Evolved Intelligence investigates by looking at service availability.

The Efficiency Challenge

In the future, emergency services will be asked to do more with less. Mobile data applications potentially offer huge improvements in efficiency and effectiveness. Not only do they promise to speed up routine tasks currently carried out using voice communications, such as identity checks or data base enquiries, but also to provide valuable new functions such as biometric screening, “life sign” monitoring and tactical asset management. They have to become “mission critical” applications if the emergency services are to stand any chance of meeting the huge demands that will be placed on them.

The Response

Many organisations have therefore started to trial such applications. Many are looking at 3G/GPRS based services. At least in part, this has been driven by the availability of smart, compact and capable handheld terminals. It has also been driven by the typical bandwidth available from GPRS versus TETRA.

However for a service to become treated as truly mission critical, for it to be rolled out and relied upon, it has to be highly available. It must be available at the times that it is most needed: during major incidents.

We have heard many anecdotes about the poor service delivered by GPRS. We therefore decided to put it to the test.

The Sensustech System

The Sensustech system uses small network probes called PAMs. These units are intended to be fitted into vehicles that are moving around to test the delivered quality of various mobile communications networks.

Amongst many things, this includes the measurement of availability, data rates and session drop rates for mobile data transmission.

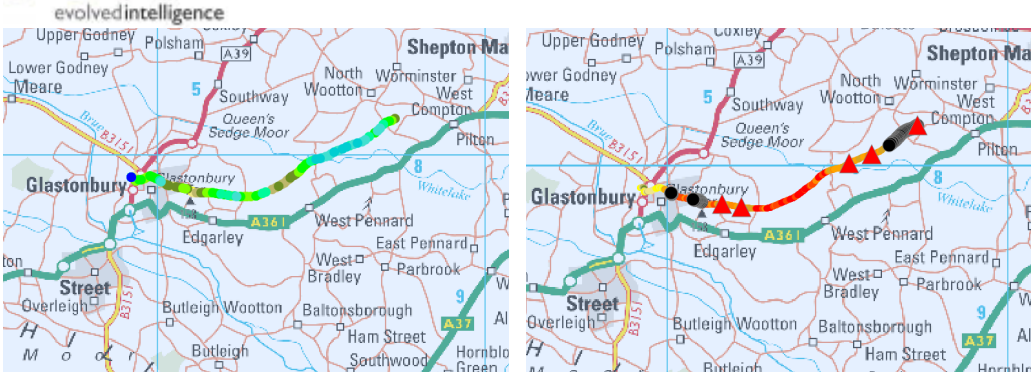
Our Survey

We decided to do some basic drive testing around Bristol, along the M5 and on rural A roads. We tested the performance of a commercial 3G / GPRS network against the TETRA service. To do this we used two units in the same vehicle to make the test as valid as possible.

The results were interesting.

On the left you can see the availability map for data services delivered over TETRA along a section of the M5 near Weston Super Mare. As you would expect the service is available everywhere with just a slight drop in performance at one point.

The right hand map shows the delivered performance via 3G / GPRS. Here we see many holes in coverage with the service degraded more or less throughout the length of the motorway that was surveyed.



The next picture shows the situation that we recorded along a section of the A361 near Glastonbury. Once again the picture is one of good coverage from TETRA but, in this case, the coverage from GPRS is almost non existent.

Urban studies showed a much better performance from GPRS. However we know that GPRS is a contended service. This means that during times of high traffic for voice (or data), such as during rush hour, a football match or during traffic hold ups, the service can become highly congested and essentially unusable.

Availability Conclusions

This survey was a very short exercise and the results are far from statistically significant. However I suspect that the image that it paints is probably, at least in general, a good reflection of the situation nationwide. Certainly to me it casts doubt upon the wisdom of rolling out mobile data applications based on commercial networks alone. This is further reinforced when, following the incident in Mumbai, I read of proposals that commercial networks may be jammed or switched off during major emergencies.

The TETRA Option

Of course data can be sent over TETRA. Our survey suggests that availability would not be a problem and that applications run via TETRA could potentially become mission critical.

The main problem is one of bandwidth. We have looked at how to make the best possible use out of the limited bandwidth offered by TETRA

To this end we have conducted a feasibility study using our ENGINE data applications platform. We developed a bespoke protocol for mobile data applications from scratch rather than attempting to modify an existing solution intended for fixed wire solutions. With fixed wire solution bandwidth is less of an issue, and quite sophisticated handshaking can be used. Using the same approach on TETRA reduces dramatically the amount of bandwidth available for the “payload”.

By developing the bespoke protocol we have demonstrated an improvement in throughput of as much as 130% without the use of compression. In practice this means that nearly the whole available bandwidth is used for delivering the "payload" and that applications such as identity picture distribution can be viable over TETRA. By further adding in data compression, still higher performance may be possible.

We also believe that multi bearer strategies, mixing for example GPRS, TETRA and WiMax, may actually provide the best of all worlds.

Conclusion

The emergency services should at least consider TETRA as a solution for mission critical applications.

Generally speaking, the issue of availability, especially at times of crisis, is overwhelmingly in favour of TETRA. Its weakness, data throughput, can be addressed for many applications through the use of bespoke protocols. The ideal solution may be in a multi bearer strategy.

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