WiRELESS

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ESN

In association with CAPITA

The UK's £1 billion Emergency Services Network will see the country's Police, Fire and Ambulance Service sharing a commercial mobile operator's network with consumers. This is the first time any country has opted to move its national public safety communications system onto a shared network, as **James Atkinson** explains

Pioneering **future critical** communications

Public safety-critical communications are on the brink of the biggest upheaval since the arrival of digital Professional Mobile Radio – an even bigger one this time. Until now, all PMR systems have been narrowband systems designed to primarily deliver instant push-to-talk voice services. The new shift will take public safety communications into the broadband data world, as experienced every day by consumers with smartphones, tablets and now wearable devices.

Broadband technology will provide Police, Fire and Ambulance Services with access to data applications such as live streaming of video from drones, CCTV, fixed and body-worn cameras to enhance situational awareness, while officers in the field can swiftly access key databases and records.

Vital visual and textual information can be sent to field officers; sensors attached to bio-harnesses can measure heart rates or how much oxygen is left in a firemen's breathing apparatus; patient data can be sent from ambulances to hospitals and visual links established with consultants who can instruct paramedics, potentially saving many lives – the list goes on.

This is the vision – the reality is not quite there yet. Many of the essential mission-critical functions still have to be written into the 4G LTE standard – a process that may not be complete until 2018.

Further to that, there is the key question of how do you deliver LTE broadband services to the emergency services? Nearly all TETRA, P25 and Tetrapol networks are dedicated public safety networks with their own spectrum.

The US has opted to replicate this model by building a dedicated 4G network with its own spectrum for its first responders. A key point to note here is that FirstNet is a data-only network, and first responders will keep their P25 two-way radio systems for mission-critical voice. Two Middle Eastern countries have also built dedicated LTE networks, but again both are keeping their existing TETRA networks for voice services.

That's where the UK's Emergency Services Network is different. It will operate on a commercial mobile operator's network (EE) shared with millions of consumer subscribers.

The UK is taking a leap into the unknown here and the challenges are considerable, not just the major ones of turning EE's network into a mission-critical one, but also for the transition issues facing the three emergency services, which must migrate seamlessly from the Airwave TETRA network to ESN without compromising service levels.

The procurement of the £1 billion ESN project is being run by the Home Office's Emergency Services Mobile Communications Programme (ESMCP) team. Tenders were invited in early 2014, shortlists drawn up in July 2014, and final bidders chosen in February 2015. Final awards were made in August and December 2015.

ESMCP split the contract into four lots (later reduced to three): Lot 1 – project management for the transition; Lot 2 – User Services (running the radio functionality, applications and devices); and Lot 3 – Mobile Services (the main area network). It is a measure of the high risks involved in the project that

many bidders dropped out. In fact, the Home Office ended up with just one bidder for both Lot 2 and Lot 3.

Kellogg Brown & Root was appointed for Lot 1; Motorola Solutions for Lot 2; and as mentioned, EE for Lot 3. Other separate contracts that must be co-ordinated with main ones include: ground-to-air services; and what is now called the Extended Area Services (originally Lot 4) to cover the parts of the UK that EE is not covering; control room upgrades; vehicle radio installation fit outs; and handheld and vehicle devices procurement.

Some 300,000 users will need new radio devices, 45,000 vehicles have to be fitted out – as do 115 aircraft – and 230 control rooms need to be upgraded to interface with ESN. On top of that there are multiple contracts, which have to be handled by individual fire, police and ambulance forces for training, vehicle fit out and so on.

The mobilisation period is scheduled to take 21 months. In which time the network has to be designed, built, tested and assured. There is then a 30-month transition period to convert users to ESN. This will be completed in 12 regional transition groups broadly based on the ambulance trust areas, starting in the North West and working around the country. Some of the challenges associated with this transition are discussed in the following pages.

The UK is pioneering a new approach to providing its emergency services with a critical communications system. EE is building a separate core network and PLMN – public land mobile

network – for ESN, so emergency services users are kept separate from EE's consumer subscribers, although the same spectrum and backhaul is common to both.

In contrast, most other Western European countries are either just finishing installing new TETRA systems (Germany and Norway) or are upgrading their existing TETRA systems and looking to add 'best effort' broadband via commercial providers. But everyone is looking to see how the British experiment will fare.

Addressing the challenges and **opportunities of ESN**

Wireless teamed up with Capita to discuss how the emergency services can best meet the challenges of migrating to the new broadband Emergency Services Network (ESN) and how they can maximise the opportunities it will bring.

The challenges of upgrading 230 control rooms, and migrating 300,000 emergency services users and 45,000 vehicles seamlessly from the Airwave TETRA network onto a 4G network without disrupting services are immense, but the benefits could be equally as rewarding.

The onus for delivering this transition is on individual fire, police and ambulance services, which must write their own business plans, set budgets, establish procurement strategies and draw up migration and training programmes.

Wireless invited some end users from the emergency services and Capita to represent the supply side to discuss the key challenges end users and industry face and to try and identify the best ways to deliver a seamless transition to the ESN.

JA: How do you see ESN and what's your approach to tackling the migration process?

Mike Walker: I think it's about organisation and learning from those who remember the Airwave implementation; understanding the problems we had there, making sure we don't repeat mistakes and ensuring we maximise the business benefits from it this time.

Dave Collins: We are also looking at some of the lessons we learned from the Airwave transition from a supplier side. But we are also discussing some of the potential issues with customers, and planning to prevent the same things happening again.

Steve Rose: From an ambulance perspective the most exciting thing

Mike Walker Airwave & ESN Manager, Cheshire Police

Dave Collins ICCS Product Manager, Capita

Geoff Naldrett Chief Operating Officer, British APCO

John Taylor Director, Radio Managed Services, Capita

Steve Rose User & Assurance Manager, NHS Ambulance Radio Programme

Mark Nottage Operational Communications in Policing (OCiP), Airwave – ESN – Operational Requirements Board, Kent Police

Ian West Group Manager North West, ESMCP Regional Co-ordinator, Cheshire Fire & Rescue Service

James Atkinson Editor, *Wireless* magazine – Chair

about ESN is the data opportunity. We are data driven anyway in the way we dispatch, and the doors are going to open for us. It's going to be about making sure that Trusts grab that opportunity and take it forward.

Ian West: I agree it is about taking on board the lessons learned from previous projects, and one of the key things for us with making the ESN transition successful is to ensure multi-agency collaboration to make savings.

John Taylor: The thing that strikes me is how much work there is to do and that is what I can't get my head around. Where is all the delivery going to come from and who is around to do it, particularly when the emergency services have recently gone through a programme of cutbacks as a result of the economic downturn?

Mark Nottage: My main role with ESMCP is around exploitation and making sure we're in the best position to exploit new opportunities. At the moment we're looking at the way the police currently invest and make decisions. We need to look at business processes, procurement and routes to market and do things fewer times, but do it much better.

We need to be a more intelligent customer and enable suppliers to be more intelligent, because that's when we'll really start to exploit the opportunities in front of us. But it is very challenging with 43 Police forces and 86 Police and Crime Commissioners.

Geoff Naldrett: My concern is the size of the task, rather than the cost or the technology. It's the amount of services, vehicles and users more than anything, and the communication of progress, which won't always be clear.

How will information be communicated to the users for regional delivery, so they know exactly what the piece of kit they're being given can do, and be able to use it instinctively and exploit its potential?.

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Mark Nottage, Kent Police

JA: Have the lessons of the Airwave transition been learned?

Mark Nottage: There's a lot of work being done on that and I think people are very focused on making sure the lessons are learned and the local transition groups are feeding back into the Home Office programme team. One of the main challenges, at least in the police, is the fact that we still do things as individual forces to meet a local capability, rather than looking at the national capability we need to build. We need to address that now and not in 18 months' time, because we'll already be tied in by then.

JA: Is ESMCP ensuring those lessons are disseminated?

Dave Collins: From a supplier perspective there's a lot of good work going on to define what those

national capabilities should be and how they can be used to enable operations in the emergency services. I think it is essential that the operational requirements are fed through to companies such as ourselves to ensure we can build that into our products to integrate with the ESN. But at the moment, every company has its own view on how to do it, so you won't actually end up with matched capability across all different vendors.

So, one of the concerns is that information needs to start flowing out to help suppliers ensure they can deliver equipment or meet those requirements, and to enable that national capability almost from day one of the transition.

Mark Nottage: When I joined the Police Technology Council, only 13 forces attended at first, but now virtually all the forces are represented and are coming together to share lessons. That is a great step forward in a year.

JA: Is something similar happening in the Fire Service?

Ian West: We've got quite a good history of sharing or collaborating on a more regional basis in the

North West – we have a joint control room coming in with the Police. But how we feed this all back into suppliers is a concern for me and what level of operational people are able to talk to suppliers and say: this is how we work and how we operate and this is what we need to see.

The key for me with North West region going first is getting the technology in. There is a lot of pressure for the North West as we've got to deliver ESN first and quickly, and other people will want information from us to learn about the transition onto this new system.

Geoff Naldrett: There should be a bigger gap between the Regions 2 and 3 transitions, so you have time to learn the lessons and then you can shorten that gap by the time you get to Regions 10 and 11.

JA: Where have you got to in terms of planning, budgets, risk assessment, talking to partner agencies and so on?

Mike Walker: The North West Region, which includes Fire and Ambulance, are ahead of the game. We've got a regional group set up and we meet monthly – soon to become weekly – to discuss progress in the Police services, and colleagues in the Fire Services on a regular basis, and fairly soon we are going to be co-located.

Ian West: We are looking to collaborate on things where we can, certainly on procurement if we can get the same suppliers that would be ideal, because that has interoperability benefits down the

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Dave Collins, Capita

CO-ORDINATION: One of the challenges of ESN is to ensure a timely flow of information to the end users and suppliers and to co-ordinate programmes with other contracts such as control room upgrades and the ground-to-air solution

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>
> John Taylor, Capita

line, and we are looking to collaborate on training and vehicle fit-out – if we can co-locate that would be helpful.

JA: Do suppliers have enough information to work with yet?

Dave Collins: We've had very good engagement to date with Police, Fire and, to a limited extent the Ambulance Services, through our regular user groups. There is discussion around functionality, but only to the point that the attendees of those sessions actually know the functionality and what might actually be delivered.

I think that information is very limited at the moment. As one of my development team said: it looks like we're getting the ingredients, but we haven't yet got the recipe. There is some technical and timescale information flowing, but joining the two together is where the gap is at the moment,

John Taylor: We haven't seen much of the equipment yet. There are plenty of unanswered questions that the equipment providers cannot yet answer, because they do not have the device specifications.

Dave Collins: The risk is we end up with what we have on Airwave – a like-for-like service – but if we want to introduce innovation it will be harder to do that later on down the line.

Mark Nottage: If we just replicate what we've done in the past and don't change the way we do things then we are missing an opportunity.

JA: What about interoperability between Airwave and ESN and control room upgrades?

Ian West: We've started to engage with both our control room suppliers in the North West and again we're getting the same sort of discussions: it's a bit early yet; we haven't had the specifications there either. In terms of innovation, we'd like to use broadband for data streaming and mobile video streaming into control rooms, but we want to know whether the suppliers are going to be able to deliver that in the time frame. One of our challenges is that we're not PSN compliant in control rooms, so we have to go through that process as well.

JA: What about the opportunity to introduce MAIT and Next Gen 999 at the same time?

Geoff Naldrett: There is this concept of only digging the road once, and so whatever other technology is around, you should try to incorporate that at the same time. MAIT is one of those things. Then there is the whole modernisation of Next Generation 999 calling. BT is desperate for some guidance from Government as to what its PSAP needs to be capable

of, and there's undoubtedly a knock-on effect from that through the control room and out the other side.

JA: How far have you got with preparing for device procurement?

Ian West: For personnel, it's an opportunity to try to get everybody onto one device, but again we're still early and the manufacturers will not see the specifications until about May, so they don't know what they're building. But we're going to start engaging with suppliers once they have got the specs.

Geoff Naldrett: This is one of the things that came out of the British APCO event in Newcastle last November. ESMCP was concerned at the low level of engagement they were getting from suppliers of end user equipment, but they are reticent to come forward because they don't know what they're supposed to be building. Does it need to be dual-band or tri-band; do you want it to be able to pick up a satellite service, Airwave and ESN? Everyone is waiting for the specifications to come out.

John Taylor: It may mean a change in how the emergency services operate as well, depending on what kinds of devices are chosen. There's quite a lot involved with this and there's a lot of decisions to make with very little information.

JA: What's the Police view on devices, as functions like push-to-talk for voice are vital?

Mike Walker: Certainly there is some non-negotiable functionality. The Home Office team had about 18 suppliers in last year to discuss this and I think it would be fair to say that there are some suppliers that are ahead of the game and thinking outside the box in term of the

solutions they're working towards. However, I agree that suppliers are in the dark at the moment, waiting for information.

JA: What's the ambulance perspective on devices?

Steve Rose: There are different opinions, but if you take a current ambulance it's got a fixed Airwave TETRA radio, a mobile data terminal, the crews have got hand terminals and you've also got a Toughbook in there. So, a lot of Trusts are interested in whether you can replace all that kit with one device.

Staff do not sit in ambulance stations anymore. They spend a lot of their working day out, and if you want them to be able to do other things, such as online training or check their emails, then you want to give them a device that enables them to do that.

What we've done so far is create a group of remote workers and almost isolated them in some ways, because the technology hasn't kept up with the mobile working requirements. But I think the broadband technology will certainly bring them up to date – the possibilities are endless.

JA: How tricky is the current device situation for suppliers?

John Taylor: At the moment there is a very narrow choice or no choice at all in terms of devices, and that means if the programme goes ahead on the scheduled start date, the time reduces for us to assist our customers – and therein lies the risk from our perspective.

Because it's not just about the device, it's about the accessories that plug into it, it's about the planning of how you train people, how you organise the removal of old devices and the supply of the new ones, and even before you get to that stage, how do you organise the routes to market and the supply chain? Where does the device get delivered to and what security is associated with this?

Geoff Naldrett: It just goes to show how important the communications aspect is, because unless the North

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> Mike Walker, Cheshire Police

West communicates its experience of transition to the second, third and fourth regions, then they'll face exactly the same problems.

Mike Walker: We've got three months between us starting and the next group transitioning, and that group includes the Met Police.

Mark Nottage: I think what we have seen in the past 12 months is that there is a real appetite and energy behind ESN. On the National Police Chiefs Council there is agreement on having shared ways of making this transition and I know that is happening at an inter-agency level too. Yes, of course it's complex and of course there's a long way to go, but I think there's a positive story in there as well.

JA: What are the device procurement strategies?

Mike Walker: We are not sure. We've heard the mandated and non-mandated device rumours. We seem to be in a non-mandated phase at the moment, but there are some big savings for the project if we take the mass purchasing route.

Ian West: That's going to be a big conversation and at the moment we've got the lead in Fire to look at the procurement strategy and pull that together. The difficulty at the moment with the Police is: are the devices going to be mandated? Because there are no discussions in the Fire Service that I'm aware of at the moment about mandated devices, so that might make a difference as to whether we procure together or not. We can still use the same procurement framework for ease of use, but nationally it would be easier if it was mandated.

JA: How are the emergency services tackling the training issues?

Steve Rose: The trouble with the training discussions is that until we know exactly what devices we are getting and what the software is, what are we going to train people on? Such is the pressure of the job that there isn't much time for

TRAINING: Training programmes involve training the trainer and then working out schedules to train staff. Little can be done yet until decisions are made about what the devices will be, but the hope is they will be intuitively easy to use

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> Geoff Naldrett, British APCO

training, so it is going to have to be a very limited package of training the trainers, and a lot of that being done by e-learning.

In the Ambulance Service we used to have seven days a year for off-the-road training, and now we get one. For that reason, I can't see us putting massive training packages in. I think the device needs to be intuitive, so you can just pick it up and use it.

Geoff Naldrett: Airwave was very new to everybody. The bonus here is we will now give people devices that, if they're in the earlier stage of their career, they've probably grown up with, so a lot of this will be intuitive.

Ian West: Training is one of the things we're looking at, but I think we're slightly different in the Fire Service in that we've got a captive

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> Ian West, Cheshire Fire & Rescue Service

audience that trains every day anyway. They use e-learning and they've got the time to dedicate to it, so it's not such a concern for us.

John Taylor: For us, quite a lot of our positive experiences with regards to training come not from full training, but from making teams available that can help at a shift change, for example. If there's somebody there who can show people how to do something, then it can work on the basis of a drop-in session. But it is resource-intensive, there's no question about that.

Mark Nottage: If ESN is going to be transformational it needs to be intuitive and people need to be shown how to maximise the potential of broadband technology, but we shouldn't need as much training with the new devices as we did with Airwave.

Ian West: It's still quite early though to decide on training, because we don't know what the device will look like.

Mike Walker: I still think there'll be an element of training. There will be people, certainly towards the end of their service, who will need to be shown what to do.

Mark Nottage: I wonder though whether we're going to move on from that to helping people maximise the potential of broadband. It's about maximising the settings on the phone, so we can tell if someone is wanted for a particular offence, for example. That's the kind of area where we need to shift the thinking, rather than how can I use the device?

Mike Walker: Until we see the control room solutions we don't know how much of that we need to do. Some functions might come at a control room level rather than from the device.

Geoff Naldrett: The other thing that comes to mind is capacity; can we do this with what we've been given to work with?

JA: What about the installation of new radios in vehicles?

Mike Walker: We're still waiting for information, but what radios are to be installed might be decided by role as opposed to by vehicle. Once we've got that decided we can wait for the suppliers to catch up with offering some devices. In Cheshire, we've got 350 vehicles with Airwave TETRA radios, which is very small compared with some other forces, but even so, just to upgrade the software takes months – never mind taking out and replacing the actual radio kit.

Ian West: We don't have a standard fire appliance and we also have a lot

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> Steve Rose, NHS Ambulance Programme

of kit on the vehicle such as speakers and microphones in the back. Some of them have strobes for radio messaging and lights, so all that needs linking together and it's not as straightforward as putting a radio in there.

It is quite complicated, but we're looking at maximising the capacity in the North West region with partners and again, if we can get ahead of the game with aerials and find out what we can purchase early and start a rollout programme, that will help.

We need to know how long the manufacturers will take to fit out a vehicle, so we can start planning that, because there's a lot of vehicles, and that ties back into the market capacity issue, which is something we're got an eye on. Can the market supply the fit-outs in time?

Steve Rose: We've got a lot of different vehicles in the Ambulance Service too. They are absolutely packed already with kit, so if there has to be a dual radio fitting then that's going to put pressure not just on space, but also on battery management and electronics.

JA: What about approaches to the end-to-end testing of new equipment?

Mike Walker: There is an assumption that the project will deliver what we have been promised and we will not enter transition until things are in place. The main issue for us is maintaining existing coverage. The question is just how much testing do we need to do – and that comes down to how much confidence we have in the Lot 2 provider delivering what they say they're going to provide.

Mark Nottage: I think it's about joining that up as well and making

sure that each service in the same area is not testing the ESN individually.

Mike Walker: We've got a tentative agreement within the North West that we will have regional testing.

Ian West: The ESN project team has already come to us about doing a test at the Manchester Derby football match. They want us to do a trial this year and then a proper operational trial next year at the match just to test the system and see how it works.

John Taylor: In the control room you're going to need something that will test that end of the operation – highlight where the weak coverage areas are. This will build up a whole coverage picture of your region, as to where it is really strong and where it is not so good.

Ian West: It's not just the coverage, it's the capacity too. You may have blanket coverage in an area, but what happens when you light it up with 2,000 people? And are we getting the pre-emption and priority features that we need and want? And the same goes for resilience of both data and voice applications, as that it critical now – a lot of fire services mobilise on voice.

Mark Nottage: Also, battery life of devices, especially on long deployments. And how do you get prioritisation around that and who is the decision maker on what transmissions take priority? There needs to be some common decision-making processes. This is what we really need to look at if we're going to optimise ESN properly.

JA: Is there enough resource out there to manage the transition?

John Taylor: The concern is the number of regions migrating in the middle of the programme. That's the time when everything is compressed and then if someone comes to us and asks for help we might have to say no, because we're completely maxed out with helping everyone else who got in there first. So, that challenge is there.

Dave Collins: Talking to customers is key, as we can actually start pencilling in timescales to update control rooms now, for example, even if there's no commercial agreement yet. And from the supplier perspective I would say a key challenge is matching the resource to meet the demands of the programme. If transition dates slip you may have people doing nothing for a few months waiting to get going, which is a risk to both customers and suppliers.

JA: What key opportunities do you think ESN will provide?

Geoff Naldrett: For me this is exactly where we should be going. We're using technology that my grandkids have got in their pockets, so that's all positive and it will make the people at the sharp end better informed and more able to respond. It's an exciting programme and I'm pleased the UK is doing it first, but it is going to be a massive challenge.

Mark Nottage: I don't think the technical challenge is the main issue. I think the real challenge is the culture, the people, the governance and the communication. Those are the areas that we really need to focus on, because that's where we'll reap the biggest benefit and make the most progress.

John Taylor: I think for the three emergency services to work more closely than I have observed them doing up until now is an important and exciting opportunity.

Ian West: For me it's about maximising the 4G broadband opportunities such as data streaming and videos, using drones and modernising

communications. It would be nice to just have to carry one device too. It's also a big opportunity to save money for UK plc.

Steve Rose: I think it's exciting from a joint working point of view. I've already mentioned the benefits of staff mobile working, but if you also look at the developments in medical science, we now have the ability to treat patients in the field and transfer data and images back to someone to make a diagnosis without necessarily having to convey patients to the hospital. Those knock on-savings are huge, as well as being beneficial to patients, so I think it's a no-brainer and I can't wait for it to come.

Dave Collins: The biggest opportunity for me is to get that solid technical foundation that's common across the emergency services and other partner agencies, which can be used to really enhance the applications. In turn, these will improve efficiency and collaboration, so we should really focus on getting that foundation in right and make sure it is one that can be built on in coming years.

Mike Walker: It's an exciting time and as a service we'll be looking at making the best use of 4G technology, delivering information faster to frontline officers, giving them what they need to do the job quicker. ESN will show police officers that they are in an organisation that is forward thinking and one that is embracing new technology.

CAPITA

ESN Services

Supporting local transition from Airwave to the Emergency Services Network

Assess

Select

Plan

Execute

As the ESN Transition programme begins, all the Emergency Services and other agencies will need to consider how they, either individually or in regional groups, manage their move from one network to the next.

This won't be a straightforward task or as simple as picking up a new phone and switching it on. There will be planning, risk assessment, device selection, logistics, disposal, commissioning, training, and many other elements to consider; all of which will need to be in place before the allotted 12 month transition phase and, importantly, coordinated with regional partners.

The cost, to each Agency, of transition will be significant and could easily spiral without detailed planning and management.

Costs will be driven by the volume of activities to be undertaken, the complexity of the programme and the capacity within each Agency to provide resources, skills and knowledge to manage.

Capita, with our deep technical experience and knowledge can provide this support through a four-phase programme of modular work packages:

Capita was a key partner in the original deployment of Airwave, supporting our clients in the ground-breaking transition and onward support for the new network. As well as Control Room solutions Capita continues to manage 150,000+ Airwave devices, both handheld and vehicle, for agencies across the country delivering a range of support and advisory services in support of operations, planned and spontaneous, to ensure public and officer safety.

That expertise is once again available through a range of services to support our clients in this next phase of network evolution.

ASSESS – SELECT – PLAN – EXECUTE

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