



Drones 2.0

Philip Mason talks to major vendors as well as critical communications technology experts about the potential evolution of UAV use by UK public safety

One of the most important pieces of new equipment leveraged by emergency services organisations in recent years has been unmanned aerial vehicles (UAVs), otherwise known as drones.

As readers of the *BAPCO Journal* will know, UAVs can have multiple uses in an emergency services context, linked in large part to their ability to travel at great height.

They are ideal, for instance, for police operations involving the finding of missing persons. Likewise, drones can also provide massively increased situational awareness during fire and rescue service missions, providing a view (or several views) of the fireground from the air.

While these use-cases are, of course, massively beneficial, technology and its use is always moving on. (A theme which is also explored elsewhere in the issue, with our piece looking at the ongoing evolution of body-worn video, from evidence storage to streaming).

At the minute, UK public safety organisations generally deploy UAVs by physically launching them at the scene. What if – using beyond visual line-of-site capability – they were able to simply fly to an incident when required?

Likewise, drone footage currently tends to only be accessible by

the control room or the command vehicle. How would the landscape change if frontline responders were able to access it in real time, literally as an incident is taking place?

These are questions we are going to address in this article, speaking first to Nokia, whose end-to-end ‘drone as a service’ solution is currently being utilised by emergency services in Belgium. We are also going to look at the potential of a platform known as TAK (Team Awareness Kit), in particular when it comes to the use of drones.

Nationwide network

Nokia describes its Drone Networks product as an “end-to-end solution comprising of Nokia drones, docking station, a ground control station, as well as dual gimbal camera with HD- and thermal cameras. Plus all related software and service components for drones as a service operations.

“It enables the use of multiple drones to fly



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was demonstrated in May of last year, with the announcement that the company has been selected by the Belgian connectivity provider Citymesh to deploy 70 drone-in-a-box systems across 'emergency zones' in the country.

To quote another statement from Nokia: "Branded SENSE by Citymesh, [the drones] will gather information in the critical 15-minute period immediately following an [emergency] call. This ensures that first responder teams are fully apprised of, and equipped to, respond to each unique situation."

The aforementioned information is collected via onboard high-definition and thermal imaging cameras, with the company giving examples of types of potential intelligence including "smoke plumes, fire parameters, and number/location of people".

Going into the deployment in more detail, head of Nokia's Embedded Wireless Solutions, Thomas Eder, says: "We're about halfway through the project in Belgium, with the deployments actively ongoing day by day. There's a lot of similarity in what we do as a company rolling out national networks and rolling out a nationwide drone system.

"If you look at Belgium in particular, the concept is essentially like a ride-sharing service, but with drones. That is, an as-a-service platform which is open right now to every firefighter and police station in Belgium."

He continues: "The deployment time for every unit across the country is supposed to be 90 seconds. We obviously can't cover the whole nation with the 70 units that we have. But we can make assessments about where the need is likely to be. Our estimation is that with the 70 units, you can cover more than 80 per cent of the emergency incidents taking place in Belgium.

"We are about to expand this service to further countries in Europe and parts of North America, to ensure that Nokia Drone Networks will be available to public safety agencies and industries in as many regions as possible."

According to Eder, as well as public safety, Citymesh has also been talking to the main power line and electric grid vendor in Belgium, with conversations also planned to open with "every industrial representative in the country". "If you're running a factory," says Eder, "and you want to check the tiles on the roof after a storm, you'll be able to book a flight for a roof inspection by drone."

The roll-out of 'drones as a service' is proving to be a success in Belgium, at least if Nokia is to be believed. While this model is not something which would necessarily be a fit for the UK



Drones improve situational awareness, for instance during wildfires

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on automated individual missions, steered from a single ground control station, running on edge cloud. The solution supports [the process] of collecting data and information to meet business needs related to security and transport. [This is] to facilitate operations in mission critical situations."

One of the key environments which Nokia has in mind for the system is public safety. This

currently (for instance, due to regulations restricting flying beyond visual line of sight), it does hint at the future potential direction of the technology and evolution of the use-case.

Another technology which is likely to be increasingly in the conversation in relation to drones is ATAK (or just TAK), which stands for Android Team Awareness Kit. Whereas Nokia's end-to-end solution is centred around deployment, however, TAK provides an – apparently low-cost, easily scalable – way of getting aerial footage to personnel in the field, in real time.

Boots on the ground

ATAK was originally developed by the US Air Force Research Laboratory in the 2000s as a response to the tactical field co-ordination challenges in Afghanistan.

Originally designed for commercial off-the-shelf Android mobiles, the software has since expanded to the iOS and Windows platforms. A civilian variation is now offered by the US Department of Defense's TAK Product Center. With this software, according to the Research Laboratory's website, users gain "real-time mobile capabilities such as live video feeds, personnel tracking, image sharing, site surveys, augmented reality, geospatial mapping, navigation, and chat".

Giving an account of the development of TAK, US-based critical communications expert Ken Rehbehn says: "It is a suite of software that provides a common operation picture for members of a team engaged in a dispersed team effort. As part of this initiative – philosophically – the Air Force Research Labs strived to make this software an open and extensible platform."

He continues: "That began with an effort to host the software on commercial, off-the-shelf, devices which were Android-based. When it comes to Civilian TAK in particular, the vision of the Research Labs is that it would be broadly available to government – local, state, federal – and private interests that have a requirement to co-ordinate teams."

This is, of course, all very well, but what you may, not unreasonably, ask is – what is the relevance to UK public safety? More to the point, in the context of the current discussion, what is the relevance to UK public safety's deployment of drones?

The first of these questions is easy to answer, with the TAK platform being available to literally whoever wants it, via the app store. This, of course, includes UK emergency services, with current and likely future usage being the topic of a planned follow-up piece later in the year.

The drones piece is more complicated to answer, meanwhile, requiring as it does an explanation of the broader functionality. To quote Rehbehn again: "TAK is a very useful tool to co-ordinate teams which are operating in a dispersed mode. That includes events like parades, large sporting events, wildland firefighting, SWAT team operations, and law enforcement activities set around a perimeter.

"The way that it does this is by implementing the common operating picture software, which displays the map and 'pin drops' of where you are, and where you or a colleague have indicated something is. For example, a person in distress."



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"People need to see what the drone sees; get that video feed"



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The aforementioned pin drops are transmitted to all of the TAK users operating in the field, in order to build a common operating picture; this means anyone and everyone involved in the operation, and not just those in the control room.

In terms of drones, the thing that makes TAK really interesting for Rehbehn is the ease with which functionality can be added via the use of plug-ins. This

means that drone manufacturers (for instance) can theoretically "provide means for users to see what the drone is seeing".

Going into greater detail, he says: "What people need is the ability to see what the drone sees; to get that video feed. And TAK is absolutely brilliant at providing that. As a TAK user, you can see where the drone is, and you can access the downlink.

"Again, the advantage of TAK is that it's not linked to a particular vendor. It's not purchased under licence as a part of a closed ecosystem.

"So, if you're working with multiple agencies, it would allow each of those organisations to come together in a single view. That enables them to see where each other is, as well as exchange messages with each other." And, of course, view aerial footage.

These few pages provide nowhere near enough space to fully explore the implications of either Nokia's end-to-end UAV solution or potential TAK drone functionality. As mentioned, we plan to do both full justice in later issues. 