



## A byte out of the Big Apple: lessons for the UK?



*The US Department of IT and Telecommunications awarded the \$500 million contract to Northrop Grumman in 2006.*

*The New York City Municipal Wireless Network has been officially launched and is operational over a 300 sq mile area. BAPCO Journal speaks to the network suppliers IPWireless and Northrop Grumman to find out if any lessons could be learned for the UK.*

**T**he five-year contract to deliver the mobile broadband municipal network was awarded by the New York City's Department of Information Technology and Telecommunication (DoITT) to Northrop Grumman. The New York City Wireless Network (NYCWiN) is widely regarded as an industry breakthrough in mission-critical municipal deployments. Northrop Grumman was the prime systems integrator for the project, responsible for the network design, deployment, application integration and on-going operation and maintenance.

IPWireless supplied the radio base stations and modems to Northrop Grumman as well as supporting the radio planning and testing throughout the city, providing a solution that was aligned to public safety as well as the needs of other city agencies.

A major challenge of the project was its deployment – installing 400 sites on roof tops throughout the city in order to attain a uniform coverage.

What makes the wireless infrastructure particularly special is that it can be used for a number of

applications, from broadband multimedia for emergency response to continuous monitoring of critical utilities and traffic control.

Different applications are being used by different departments – the police are focussing on mobile data for their vehicles, while fire and ambulance are focussing on their command and control vehicles. Municipal departments, for example, are using automatic vehicle location to track the movement of waste disposal vehicles to ensure they are on the right routes.

Tom Afferton, Director of Wireless Engineering for Northrop Grumman's Information Systems Sector, explained that while public safety was one of the primary drivers for the project, New York was also looking at value for money – explaining the multi-agency aspect of NYCWiN. "For example, the department of transportation is now moving to wireless connectivity for all its traffic signals, thereby avoiding paying for leased line."

So what can the UK learn from New York? Afferton

believes there are two main messages. "Resilience is important. One of the motivating factors for the City was that in numerous emergencies, commercial networks have proven to not be reliable, either because of lack of power or because the networks would get overloaded from consumers."

As New York's use of data had begun to shift from "nice to have" to critical, the City recognized the increasing risk of dependency on commercial networks.

Afferton hopes to bring to the UK the concept of broadband in a resilience-dedicated network and to a multi-agency scenario – the second part of his message. "We recognise that a large part of the challenge is bringing together multiple agencies together," but that it can be done can now be seen in New York.

Keith Dewar, VP EMEA Marketing for IPWireless, adds that many digital adopters are now looking at what New York is doing and how it is working. "One of the things we know about public safety is that it is very conservative. But New York is an important proof point and as a result it is now starting other projects."

### Culture change

Now that the hardware and software is in place, New York's emergency responders are undergoing culture change, remarks Afferton.

"We are seeing it with video because the system has the bandwidth to support video and the system opens up the capability to share live streaming between agencies. Fire departments can potentially get access to police footage from a scene."

Recent examples of IVS deployment include Operation Safe PATH 2009 – a full-scale, multi-agency exercise to test the City's and the Port Authority's response to an Improvised Explosive Device (IED) detonation on a New Jersey-bound Port Authority Trans-Hudson

(PATH) train – and US Airways Flight 1549, which ditched into the Hudson River last January. In each case the IVS was mobilized at the incident scene, enabling first responder command units to stream video back to the City's Emergency Operations Centers.

Afferton adds that an important benefit of IPWireless's technology is its ability to prioritise network usage and applications eg between building inspectors and emergency responders. "That was fundamental to our success in New York, where we installed a prioritisation scheme system."

### Broadband trial

In 2007 the NPIA carried out a public safety network trial in Lewes (Sussex) with Sussex Police, NextWave IPWireless, and Northrop Grumman, using the same technology as in New York.

During the trial, the Sussex Police used the mobile broadband network to successfully transmit streaming video from fixed positions, from body-worn apparatus, and from moving vehicles, tested at extreme pursuit speeds, to the command station at police headquarters.

The Sussex Police created simulated crime scenes to gauge how well the mobile broadband network could serve the police in "real-life". The trial also showed that forensic evidence could be transmitted from the crime scene to the command station very quickly. Although the Lewes trial was a success, thereafter the NPIA moved its focus towards commercial mobile data.

"Which is great in getting terminals into the hands of officers but the point of our trials is that you cannot rely on commercial networks. But this is yet to be addressed."

With New York now fully operational and the UK's mobile data project at an advanced stage, perhaps now is the time to re-address mobile broadband.

### What the network provides

The network provides first responders with high-speed data access to support large file transfers, including fingerprints, mug shots, city maps, automatic vehicle location, and full-motion streaming video.

A fully-interoperable, IP-based network, NYCWiN enhances coordination by linking first responder personnel, on-scene, wirelessly with incident managers at remote sites through real-time data and video feeds.

Municipal applications, including automated water meter reading, traffic signal control and handheld inspectional programs are now planned or underway, allowing New York City's mobile workforce to not only to function more efficiently, but also to realise substantial cost savings across participating agencies.

The City is also looking to deploy an automated vehicle location system for hundreds of vehicles across more than a dozen City agencies.

This effort will help meet Mayor Bloomberg's PlaNYC goals for improved sustainability by decreasing vehicle usage, improving gas consumption, and providing

real-time management of the City's vehicle fleet.

### The challenge

The system needed to deliver mobile, multi-megabit service across more than 300 square miles of glass and concrete, and through 5,800 miles of roadway. The service had to maintain performance across all its sectors, without degradation when under heavy loading and incident testing.

The infrastructure also needed to provide real-time multi-media applications such as streaming video.

The solution also needed to be based on a single integrated infrastructure, facilitation communication between municipal entities, and containing costs by decommissioning leased-line services.

### The solution

IPWireless used its V5 Multi-Standard 3GPP Mobile Broadband platform, powered by TD-CDMA technology. The network consists of approximately 400 cell sites spanning all five New York boroughs, using licensed 2500 MHz spectrum to provide citywide coverage.

The TD-CDMA is equipped with low-latency mechanisms to deliver prioritised and preemptive network access to specified users and groups (eg emergency response personnel).

### Technical advantages

- N=1 Frequency Reuse, which enables the entire network to be deployed using a single 10MHz TDD channel, lowering spectrum acquisition costs and making large-scale networks cost effective.
- Intercell Interference, which facilitates interference cancellation between adjacent cells, supporting larger cell sizes and higher data rates at the cell edge.
- Per-sector performance: delivers higher sector capacity and simultaneously number of users than competing technologies. Dynamic scheduling of radio resource to match user instantaneous throughput requirements.
- Integrated Security: restricts network access through the use of licensed spectrum, multiple layers of user authentication and quality of service/tier of service compatible with end-to-end encryption of user data.