1. Background

Airwave
The Airwave service is a digital radio communications network designed to meet the needs of the police and other public safety organisations. The contract to provide the Airwave service was awarded to BT in February 2000 by the Police Information Technology Organisation (PITO), on behalf of the Home Office. The service is based on the European open standard TETRA. It was created, in large part, as a response to the inadequacies of the pre-existing separate police, fire and ambulance private mobile radio networks. These were highlighted during the Kings Cross tube station fire, where the lack of inter-communications between these networks was a key problem on the ground. Airwave is now owned by Guardian Digital Communications, a company that is owned by two Macquarie investment funds - Macquarie Communications Infrastructure Group (MCG) and Macquarie European Infrastructure Fund II (MEIF II). Airwave owns and operates the Airwave network, which provides voice and data solutions to a variety of emergency services and public safety organisations, including the police, fire and ambulance services. It is the biggest public safety network in the world today.

TETRA
TETRA is short for TErrestrial Trunked RAdio, an open European standard for digital trunked radio. The Home Office specified TETRA as the standard for Airwave.

Issue
The emergency services (in both the public and voluntary sectors) are concerned about their current and future communications systems needs. With the increasing demand for new services, for example video, to meet operational requirements, the emergency services believe that the existing allocation of spectrum supporting the current voice-and-data-based Airwave system may not be enough to meet all requirements – for example, at the 2012 Olympics. They argue that additional new spectrum must be made available, not only to meet their existing needs on Airwave, but also to meet emerging operational demands.

Ofcom is continuing the policy, adopted by the government in 1998, that public bodies, including emergency services, should pay for spectrum on a comparable basis to the commercial sector based on administrative incentive pricing. This involves setting spectrum fees on the basis of the estimated opportunity cost reflecting the costs that their use of spectrum imposes on society by denying the spectrum to alternative uses. Given that the operational market in spectrum trading is still developing, it is argued by some that “administrative incentive pricing” has yet to demonstrate significant benefits and remains a theoretical exercise whose practical effect is to return funds, less Ofcom administrative overheads, from the emergency services budgets to the Treasury.

Depending on the available spectrum and the nature of the underlying architecture of the radio system, it might be necessary to make further, timely investment in new infrastructure. Although spectrum management authorities are aware of these concerns, it is not yet clear that remedies will be sufficient, affordable or timely – the end users remain doubtful.

Appendix 1 to this Report lists specific points raised by contributors to the EURIM discussion held on 10 Dec 08. Appendix 2 includes information provided by Ofcom on the Reform of Public Sector Spectrum Management (including the Emergency Services).
2. Summary of Main Points

2.1. An enhanced Airwave (or some alternative national system) is vital to public safety and will remain so in future. However, congestion on the current network in busy locations at times of major events or serious incidents can lead to queueing at those locations. More spectrum to support Airwave is about to be released. The new release is unlikely, however, to be enough for all situations in the longer term.

2.2. In the lifetime of the existing contract there are no fundamental technological barriers to an enhanced, Airwave-based solution to the presently congested system.

2.3. Judging by past experience, it could take another ten years to solve the problem (of shortage of capacity on an overloaded system). However, well within that period Ofcom’s auction plans are likely to have resulted in the optimum spectrum (ie: that best suited to the emergency services’ requirements) being sold to the highest bidder, who might then be willing to re-sell to the emergency services, assuming the Treasury provides the funds to outbid others in such secondary trading, or that affordable allocation has been made through an administrative process attracting “administrative incentive pricing ” (AIP).

2.4. At the moment nobody is selling spectrum that is suitable for Airwave. However, more is expected shortly to become available; and the MOD’s December 2008 statement on UK Defence Spectrum Management sets out its plan, subject to market and other developments, to release spectrum from the UHF band by November 2010. This could potentially be acquired and used to support Airwave in the near/medium term. Fortuitously, Arqiva, who acquired spectrum (2x2 MHz) are now concurrent holders/licensees of the spectrum with Airwave through spectrum trading and this is helping Airwave support some of its public safety activity.

2.5. There is an emerging police requirement for additional spectrum to meet new operational requirements. However, there is, as yet, no coordinated, coherent, approved and funded operational requirement across all blue and orange light services for additional services on an enhanced Airwave (or its equivalent).

2.6. The government has undertaken to reform public sector spectrum management to achieve greater efficiency and opportunities for sharing with the commercial sector and the Public Safety Spectrum Policy Group is working in line with this programme: “The PSSPG has agreed an outline plan for establishing the future spectrum management organisation and has commissioned a consultancy study to define resources and the governance structure of this future spectrum management organisation.” The final report was delivered in Autumn 2008 to the UKSSC.

2.7. Public bodies, including emergency services, will obtain any additional spectrum requirement from existing allocations or through the market except in cases meeting strict criteria as detailed in the Government’s Response to the Independent Audit (para 2.4). The government would then direct Ofcom to make the spectrum available administratively.

2.8. The extension of market based charging for spectrum above 1 GHz will result in a significant increase in financial commitments by NPIA for police use of these bands. Most police spectrum is above 1GHz and at present NPIA pays £2.7million for frequencies below 1 GHz and £300k for those above 1 GHz (although Ofcom plans to review these figures as part of its strategic review of spectrum pricing). It would be premature to speculate about the size of any increases but, based on a comparison with rates paid by commercial operators, there could be increases of the order of between £13million and £25million per annum, although these are not expected before 2011.

2.9. Within the EU, the debate on harmonised spectrum allocations for pan-EU emergency services has not achieved a consensus. Much depends on negotiations leading to a second reading of the Telecoms Framework Review scheduled for April/May 2009. Meanwhile, Ofcom is pressing ahead with its auction programme.

2.10. The focus of the debate is on public and commercial organisations involved or associated with public safety. The position of the third sector remains uncertain.
3. **Industry View 1 – Motorola**

3.1. Airwave is currently able to meet the minimum voice and data requirements of the emergency services, but traffic is rising and the data component is becoming more important operationally. As the demands on the emergency services grow, more spectrum is required to meet traffic growth. Some operations require much more data, particularly for location or identity-based services that use video. This issue is not being addressed and is becoming a high priority if our emergency services are to meet challenges posed by high profile events such as the 2012 Olympics.

3.2. A new solution requires reliability, robustness, availability, and ubiquitous coverage. The most suitable spectrum to provide this solution lies in the 470-862MHz UHF range, the region currently occupied by analogue television and expected to become available after digital switchover, in 2012. However, it is not practicable for the emergency services to wait until 2012 – not only because of the lead time in designing and building a new radio architecture, but also because Ofcom will have begun its auction process in 2009, well before the emergency services can assemble any sort of coordinated, approved and funded operational requirement case.

3.3. Airwave/TETRA is not necessarily the right solution - many other technology solutions are available to handle public service communications in an emergency, including WiMax and GSM/3G public systems. However, they all fall short of the operational need – in terms of reliability, security, coverage and availability. Commercial alternatives to a dedicated service are all based on commercial imperatives, and are not designed around a specific set of user-defined requirements. One example of this comes from the police, who have two closely-linked operational requirements underpinning a command and control network – location identification and suspect identification. The fire service is also interested in using this technology to locate people inside target buildings.

3.4. It is important to understand that any new broadband network will not necessarily replace the existing TETRA-based Airwave system. It could well be complementary in operational terms so the solution possibly lies in over-laid schemes.

3.5. However, approved and funded business cases are lacking. There is an obvious need for a coordinated business case that draws together the requirements of all the emergency services. Unless such a determined user voice makes itself heard, the drive for more spectrum will be seen to be coming only from the suppliers of radio equipment and systems.

4. **Industry View 2 - EADS**

4.1. Business must make it clear that a spectrum solution is driven by users rather than suppliers. Customers do want mobile broadband that is robust, fast and secure. The UK was instrumental in developing the IPR around TETRA, but it took 10 years to achieve. We therefore need to start developing a standard, non-proprietary spectrum solution now. Unfortunately, a harmonised approach to the allocation of spectrum for the emergency services is missing from the UK public policy approach to spectrum management and is thus somewhat at odds with the approach taken by the European Commission.

4.2. Public safety gets a raw deal on spectrum. Equipment standards are one thing, but developing new equipment to exploit new spectrum involves running both old and new systems side by side for a period until such time as the old system can be switched off (cf: TV switchover) It is feared that regulators might take decisions that could narrow our options and compromise the needs of the emergency services, for example, by selling on the open market the spectrum on which a “new Airwave” would depend. We really must have a harmonised band at EU level, supporting an EU-wide deployment of “TETRA Mk 2” but Ofcom appears to be at odds with that sentiment. The markets will not provide a solution for the emergency services, so the UK’s current approach to spectrum management in this area must be reviewed.

4.3. The Communications Act 2003 does not give scope for allocating spectrum for the emergency services, and the current consensus on the EU’s Communications
Framework Review is most unlikely to redress this omission. Policy on public safety, rather than market forces must help drive the spectrum requirement.

5. **Regulator’s View**

5.1. The government and Ofcom believe that, in general, the best outcome for society is achieved if spectrum is assigned through the market. The government has undertaken that national security and public safety will remain paramount. Ofcom agrees with the Independent Audit and the government that responsibility for obtaining, financing and managing spectrum for public services should rest with the public bodies concerned as for the other resources and assets they require.

5.2. There needs to be an objective and evidence-based assessment of future spectrum requirements for the emergency services. An essential first step is a rigorous audit of current holdings and future demand study similar to that carried out by the MOD for defence. It is important this work considers all options for meeting communications needs (and does not start from the assumption that all requirements (eg. video, media rich content, etc) need to be delivered over a dedicated Emergency Services network).

5.3. Ofcom is liaising with the NPIA over their review of future communications requirements so as to help the NPIA consider the associated spectrum implications.

5.4. The Emergency Services user community must engage with their sponsor departments and in turn, departments involved must engage proactively with the policies in place to ensure strategic requirements are met for the user community.

6. **Users’ View – NPIA**

6.1. The National Policing Improvement Agency provides standards for policing – the organisation is police-owned and led. A Chief Constable is the CEO. The NPIA provides expertise and support in many areas – it owns the Police National Computer, DNA database and national IT and training services, and is part of a national service to police. NPIA pays for radio spectrum used nationally by police at a current cost of £ 3 million annually.

6.2. The expectation of significant fee increases for spectrum, how a spectrum market works for the police, and the timely acquisition of sufficient and suitable spectrum to meet future requirements are all major concerns. The NPIA is currently aiming to roll out the Future Communications Programme (FCP) which aims to deliver a replacement for the Airwave service when current contracts expire, and cover all three blue light emergency services in England, Wales and Scotland. FCP will be capable of supporting multiple mobile applications including voice, data and images. The service will roll-out between 2014 and 2020, but the programme is still at an early stage of development. FCP will require extra radio spectrum beyond that currently allocated to the emergency services in order to operate.

7. **Recommendations**

7.1. The main users of Airwave articulate, through the NPIA, a coordinated requirement for (1) the additional spectrum required to meet current operational voice and data needs and (2) the additional spectrum required to meet future (broadband) services.

7.2. The several bodies and agencies involved adopt a mutually agreed timetable for the acquisition and deployment of new spectrum that takes into account external factors such as the demands of the Olympics and any time needed to design and build new radio infrastructure.

7.3. Progress should be more visible (consistent with the need for security) on the state of negotiations between the NPIA, Airwave, the Olympics Security Directorate from the Metropolitan police and Ofcom’s Spectrum Planning Group for the Olympic Games (SPGOG) aimed at identifying suitable additional spectrum.

7.4. Ofcom relax their approach to administrative pricing until such time as the market has developed to the point where the opportunity cost to the emergency services can be accurately determined by free-market pricing.
Points Made During Discussion on 10 December 2008

1. The following points were made from the floor following the speakers’ presentations:

   a. Concern was raised that the police already have to borrow spectrum from MoD in order to police the Notting Hill Carnival and London New Year celebrations. The London Olympics in 2012 will be an even bigger test. Now that the spectrum requirements have been estimated, the process of finding suitable and sufficient spectrum is just beginning.

   b. Police forces are already determining user requirements at a local level, but the police do not have any vast surplus holdings to be re-allocated under some refarming programme. To meet user demands, the supplier must be able to supply the correct spectrum – a policy that lacks point and purpose if the correct spectrum is unavailable. The current holdings of the emergency services are an ad hoc suite of bits and pieces. The Department of Health bought additional spectrum and it will contract with Airwave to supply extra channels to support the network. This may not be enough for the added traffic load in the near to medium term and the case for any further additional spectrum will need to be made.

   c. Chief Constables are operationally independent and are purchasing off-the-shelf technologies to meet policing requirements. The European Commission also has concerns about the operational requirements of Category 2 responders to civil contingencies, such as flooding. This is key if the emergency services specifically want to limit the number of users and capacity overload on any dedicated emergency service system. This must be considered in line with interoperability requirements between emergency services users (Cat 1 type users) and Cat 2 users.

   d. Airwave was initially licensed to roll out the network on 2x3MHz of spectrum before the creation of Ofcom. Ofcom advises that at present Airwave has been given access to all of the available 2x5 MHz of spectrum.

   e. The use of US technology as a possible contender to Airwave is unlikely because it is designed to co-exist with broadcast transmissions which use different standards.

   f. With only 24 trades to date, the free market in spectrum is still in its infancy and therefore the allocation of spectrum to the emergency services subject to “administrative incentive pricing” remains at best a dubious concept. A far more lenient interpretation of the regime is required if current operational demands are to be funded from within current departmental budgets.

   g. Spectrum allocation, other than by auction, does not imply over-ruling Ofcom: An immediate, full exposure of public safety spectrum to the free market was not one of the recommendations of the Cave review. However, it is difficult to understand how market forces should influence spectrum allocation for the emergency services in the short to medium term. Spectrum for public safety purposes should be allocated in the interests of public policy.
Reform of public sector spectrum management (including emergency services)

Background
In response to a governmental review of spectrum management carried out in 2002 by Professor Martin Cave, the government included in the Communications Act 2003 provisions to allow Ofcom to make regulations to introduce spectrum trading. Ofcom made the first such regulations in December 2004. These enable holders of specified WT (Wireless Telegraphy) licence products to transfer all or part of their licence rights and obligations to another person. The regulations have been amended on various occasions to extend to other licence products but have not yet so far been extended to licences granted to emergency services. However, this situation is set to change as part of the government’s reforms of public sector spectrum management described in this Appendix.
In parallel, Ofcom has also been pursuing a policy of spectrum liberalisation, the removal from WT licences of unnecessary restrictions on how spectrum is used.
The legislation on the management and use of radio spectrum management has now been consolidated in the Wireless Telegraphy Act 2006.
Demand for radio spectrum for new services such as wireless broadband is growing. The public sector (including civil aviation and maritime) holds about half of the spectrum below 15 GHz. The government commissioned Professor Martin Cave to report on how management of these extensive holdings could be made more effective, thereby releasing spectrum for innovation and growth.
Professor Cave reported in 2005. His *Independent Audit* recommended a radical reform of public sector spectrum management to apply the market-based principles that Ofcom was introducing in the commercial sector. In particular, he recommended that public bodies should be able to acquire and release spectrum though the market by spectrum trading.

Status
The government, with Ofcom’s support, accepted his recommendations and, in March 2006, committed in its response to an ambitious programme of reform. This included the principle that public bodies would in future acquire any additional spectrum they need from the market instead of by administrative assignment by Ofcom although the government would, as a last resort, be prepared to direct Ofcom to make spectrum available if it could not reasonably be provided from an existing allocation or through the market and there was a demonstrated safety or security critical need or mandatory international obligation.
Progress and future plans were updated in the March 2007 *Forward Look*. Ofcom is playing a full part in this process and, following consultation, has put in place its *Spectrum Framework Review for the Public Sector*. A key feature of this is the progressive introduction of tradable recognised spectrum access to enable public bodies to release spectrum to, or share it with, commercial operators and to acquire additional spectrum through the market.
Ofcom has consulted on the first stage of implementing this policy in the 406.1-430 MHz band, (including the 2x2 MHz allocation to the Department of Health made in late 2006) that is envisaged as being available for Airwave expansion.

Additional information furnished after the EURIM meeting on 10 December:
At the last PSSPG (12/12/08), Ofcom has confirmed that there will be no change to the current spectrum charges paid by the Emergency Services. Ofcom will also be working with the departments involved in introducing pricing changes in line with the departmental Spending Review cycle (SR 2010).